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THE HISTOLOGIC AND CLINICAL SIGNIFICANCE OF MALIGNANT CHORIOEPITHELIOMA[1]

REMARKS ON SPONTANEOUS RECOVERY THEREFROM — DIFFERENTIATION BETWEEN BENIGN AND MALIGNANT CHORIOEPITHELIAL PROLIFERATIONS — A REVIEW OF 206 CASES

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WE generally regard pathology as one of the few exact departments of medicine. Cellular pathology, *per se* (excluding biology), is supposed to permit an exact diagnosis from the actual changes in the tissues; for a well-defined pattern in cell-construction and tissue-arrangement reflects the various diseases. This applies particularly in the diagnosis of all neoplasms. Virchow's division of the neoplasms established a clear conception of the histologic and clinical significance of the various tumors. This fundamental structure of the doctrine of neoplasms, given in his *Onkologie*, has been in some way disturbed by later researches. The difference between an epithelial growth, a carcinoma, and a sarcoma, has been so diminished, that authors like Hansemann (238) have advocated a morphologic division. Gebhard (239), too, states that we are sometimes unable to differentiate between carcinoma and sarcoma, and that these two groups do not represent scientific entities. The histologic significance has not been affected by this controversy. There are certain signs which enable the pathologist to judge of the nature and especially the malignancy of a growth. These must be present before a tumor can be declared malignant. But, inasmuch as all our histopathologic conclusions are based upon clinical observation, it is readily understood that the clinical course will for some time still exert a conspicuous influence upon the value of the histologic diagnosis. As long as the etiology of the neoplasms remains unknown, the possibility of drawing erroneous conclusions of the cause from the effect must be admitted. In a pronounced case of malignant growth, the pathologist deals with facts and the diagnosis is comparatively easy, whereas in the beginning of such a growth a definite opinion might be impossible. It is relatively easy to recognize the typical changes in the tissues, but only long experience enables us to draw the proper conclusions.

When organs, or parts of them, as for instance the skin, are involved, caution will commend the immediate removal of the suspicious growth, for this loss of tissue will not impair a vital function. Matters have a different aspect, however, when the question of removal of a whole system of organs, as the uterus and its adnexa, has to be decided upon. This question cannot be decided alone by the pathologist. Changes in the structure and arrangement of the epithelium, new formation of glands in the uterine mucosa, at times force him to point out his suspicion of malignancy to the clinician; the deciding factor, however, in such suspected cases, rests with the clinical observation of the case. Similar phenomena are observed, not so rarely, in the glands of uterine and cervical polyps. Although the pedicle

[1] Read before the Chicago Gynecological Society, February 16, 1906.

shows normal structures, the polyp is often described as carcinomatous. This diagnosis is, to say the least, hasty. Such a polyp is, on account of its location, subjected to all kinds of insults, mechanical and chemical, which might possibly produce such suspicious changes in the glands.

The pathologist is placed in the same position by all those proliferations, which originate in the cell-covering of the villi which might develop a chorioepithelioma malignum. How deleterious these proliferations are for the patient, and their relation to other growths, has been discussed by me before this Society a year ago. Many probably will maintain that the mere suspicion of such a growth should be sufficient indication for the removal of the diseased organ — in most cases the uterus. This is not so. The number of cases of chorioepithelioma observed is already so large that science is able, in most cases, to differentiate between simple chorioepitheliomatous proliferations and chorioepithelioma malignum. The latter is looked upon as a product of pregnancy. Fetal epithelium, and the villi covered by this epithelium, are constituents of this growth. Both structures, however, are also found in normal pregnancy and its sequelæ, and especially after hydatid mole. As far back as 1898, Carl Ruge (207), in discussing a paper by Veit, upon *Deciduoma Malignum*, pointed out that clinical experience forces us to differentiate between a benign and malignant syncytioma. This statement by an authority has, it appears, not been generally appreciated. At any rate the literature shows quite a number of cases of chorioepithelioma reported by good authors in which the extirpated uterus proved to be normal.

THE NATURE AND ETIOLOGY OF THE MALIGNANT CHORIOEPITHELIOMA

The typical chorioepithelioma malignum, tending to a fatal issue, possesses many of the features of a malignant growth, and may justly be called so. Its cells have a highly invading and also destructive power, and like other malignant tumors it presents rapid self-destruction. The malignancy is also proved by the tendency to produce metastases and these show the same cell-arrangement as the mother-growth. Malignancy and benignity are, not considering the natural powers of human self-defense, nothing else but variations in the vitality of the cells. It is the fundamental change of the biologic character, Petersen (226) — emancipation, as I have called it, according to E. Neumann — which stamps the malignancy upon the carcinoma-cell. The vitality of the the chorionic epithelium, the trophoblast, as it is called in early stages, is at least equivalent to the developmental activity attributed to all embryonal cells. It is greater than in the already differentiated common epithelium, greater than that of the embryonal cells composing a teratoid, which leads to metastases only after emancipation of certain cells, a process similar to that in the common carcinoma. Still the vitality of the trophoblast is limited to the production of only 3 cell-forms: Langhans' cells, plasmodium (syncytium), and syncytial cells. All the latest researches upon chorioepithelioma confirm the unity of the 2-cell layers of the villi, and corroborate the great adaptability and multiformity of the trophoblastic cell. As I emphasized before[2], it is the surrounding which gives the chorioepithelioma-cell its form. The latter is not a differentiated cell. It is neither an epithelial nor connective-tissue cell. It is something between both. Consequently it is able to assume the external features of both. They might appear as spindle-shaped cells, as decidua-like cells, as giant-cells, etc.

The nutrition of the chorionic epithelium in man is justly considered to be independent of the ovum, for the greater part. Its cells are nourished by the maternal blood. They are parasitic and consequently will be able to proliferate after the ovum has died. A retention of the dead ovum for many weeks after its death is something very common. The size of such a dead embryo shows a conspicuous disproportion to the development of the membranes. The villous substance exhibits microscopic signs of degeneration, but the epithelium is well preserved and may show mitoses, glycogen formation, and often considerable proliferation. At other times we find the villi well preserved, whereas the chorionic epithe-

[2] Schmauch, "Chorioepithelioma Malign., Its Etiology and Relation to Embryonal Tumors. J. Am M. Ass., 1904.

lium has partially perished and presents itself as a thin endothelium-like layer. It is left for future investigations to decide what, in these cases, impedes the naturally great vitality of the trophoblast, and what changes in the maternal organism cause the death of the fetus — by killing its roots, the trophoblast. The death of the embryo or the disease which caused it, as for instance syphilis, has in my opinion not much influence upon the proliferation of the chorionic epithelium. I agree perfectly with Charles Nelis (237), and other French authors, who regard the hypertrophy of the placenta in syphilis as a kind of self-preservation.

In carcinoma, etiology presents the unknown factor. To this fact we have become so accustomed, that even the new term "ultramicroscopic," chosen by some adherents of the parasitic etiology of malignant growth, is only begging the question. I doubt very much whether the substitution of this word for the "unknown" etiology will prove to be progress. The rôle of pregnancy as a part of the etiology of chorioepithelioma is an undisputed fact, but it is not understood what causes the malignancy. I have tried to clear up this unknown factor, biologically, by applying Ehrlich's theory to it, assuming, as Veit did, a disease of the maternal organism, but not a sarcomatosis uteri; rather a deficiency of the physiologic resistance against the invading embryonal trophoblast. This explanation has been accepted by many writers for want of something better. The experimental proof has not yet been given, *though chorionic epithelium, transplanted in animals in the proper way, results in a hematoma and proliferation of the epithelium.*

Such an artificial chorioepithelial tumor is, however, only a transient growth, it disappears in the same way as some of the so-called vaginal metastases do — the "villous infarcts." Other authors, as Stoeckel, Runge, Pick, incline more to regard the lutein degeneration of the ovaries as the cause of the abnormal proliferation of the chorionic epithelium. Lutein cysts are frequently, but not always present in chorioepithelioma. It has recently been stated again that in all cases of hydatid mole and chorioepithelioma examined for these structures, lutein cysts were found. That this is a mistake, I strongly emphasize here again,

Fig. 1. Typical, malignant, generalized chorioepithelioma. Metastases in lung, from my own case; the growth has developed within a thrombus. Note the regularity in the arrangement of Langhans' cells and syncytium. The white places represent vacuoles. Object. $\frac{2}{3}$. Magni. 135 diam.

l. c. Langhans' cells.
p. Plasmodium-syncytium.
v. Vacuoles.

for in the case described by me there was neither a corpus luteum nor lutein cysts. Circumstances prevented the publication of the picture of the ovaries in my case, in my previous papers, and I would like here to avail myself of the opportunity to do so (Fig. 10).

As lutein degeneration is not to be found in all cases of chorioepithelioma, I have concluded that it has to be regarded as a consequence of the chorioepithelial growth. This theory has been substantiated in a way by Seitz's (215) researches. He found that the proliferation of lutein cysts is a physiologic phenomenon, something to be found in every pregnancy. It is not typical for hydatid mole. Seitz says that "The presence of fetal elements in the mater-

nal organism is common to pregnancy, hydatid mole, and chorioepithelioma. As long as these fetal structures are present, the process of maturing of the ovum and also ovulation stops, and the follicles degenerate." The findings in the ovaries of patients with chorioepithelioma are in perfect accordance herewith. We find formation of lutein cysts and a dispersion of lutein cells in most cases, but there are 11 cases recorded in which the ovaries did not show any macroscopic changes; in some even the common proliferation of lutein cells was missed. Some of these ovaries are described as atrophic, and in others even no corpus luteum was to be found. In the cases of generalized chorioepithelioma described by Schmauch (4), Zaborsky (55), Busse (23), Case 1, no corpus luteum was present. In those of Hinz (97), Risel (101), Case 4, Gebhard (31), Case 3, and Wallart (100), a corpus luteum was present, but there were no other changes. All these patients died. The reports of Steinhaus (228), Findley (131), McCann (129), Littauer (220) — localized chorioepithelioma — show no changes but atrophic ovaries. Entirely incompatible with a bioplastic energy of the lutein is Lomer's (166) case of destructive mole (atypical chorioepithelioma). Ten days after removal of the mole, double ovariotomy was performed. Although it is not stated in the abstract of this paper that the cysts were lutein cysts, the description makes it very probable. Three weeks after the ovariotomy the uterus ruptured spontaneously and had to be removed. Lomer states decisively, that the uterus and its serosa did not show anything abnormal at the time of the laparotomy.

DEFINITION OF MALIGNANCY IN CHORIOEPITHELIAL PROLIFERATIONS

The question of the etiology of chorioepithelioma assumes another aspect, when the cells composing this growth are regarded as malignant in themselves, in the sense of a carcinoma, or sarcoma-cell, or when the growth is considered to be the result of a displaced blastomere (teratoid genesis). As stated before, I regard this peculiar growth as a consequence of pregnancy and attribute the proliferative tendency of its cells to a deficiency of the resistance of

Fig. 2. Transition form, syncytial ch., Case 1, Gebhard (103), (localized growth). Section from the uterus. Between the necrotic muscle-fibres lie chorioepithelial masses. Note the prevalence of syncytial masses and large syncytial cells. The dark masses on the right and lower part of the photograph present syncytium breaking up in spindle-formed syncytial cells; absence of fresh blood. Compared with No. 1, the most prominent feature of this picture is the irregularity in the arrangement of syncytium and tumor-cells. Object. 1. Magni. 45 diam.

s. c. Syncytial, spindle-formed cells.
m. Uterine muscles.
v. s. Vacuolated syncytium.

the maternal organism, and not to an emancipation of the chorionic epithelium.

Defining malignancy in chorioepithelial formations, we naturally must apply all those criteria which we use in determining the nature of other progressive growths. Among these ranks first the conception of an actual new growth. As long as the chorioepithelial cell-masses are still in connection with the villi, we might speak very well of a proliferation, but not of a new growth. The latter term presumes a kind of independence, an existence of its own. An epithelial proliferation is no carcinoma so long as it is still connected with its native soil. Even separation does not decide malignancy, which is proved by the so-called epidermoids (kystes epidermiques), and the congenital dermoid

cysts of the ovum. It is the separation combined with the free growth which determines the malignant character. We therefore have to differentiate distinctly between simply deported villous masses, and separately proliferating epithelial masses. A villus, inside of a vein, or inside of a blood-clot, does not mean malignancy even if the chorionic epithelium shows excessive proliferation. It only proves the mechanical part of the proliferation and the developmental activity of embryonal cells. The possibility of such an occurrence has to be admitted even in a normal pregnancy, although extensive deportation of villi must be regarded as pathologic. In Schmorl's (229) opinion it happens only in cases of mechanical lesions of the uterus, in long protracted labor, placenta praevia, and uterine rupture. On the other hand deportation of chorionic epithelium, syncytial buds, and embolism of placentary cells, must be considered physiologic, since it occurs not only during labor, but at all periods of normal pregnancy. Whether the deported villus comes from a normal placenta, or a mole, does not make any difference. The deportation, *per se*, does not mean malignancy, and the proliferation of the villous epithelium does not prove its progressive malignant character; for as long as it stays in connection with the villus, and as long as it does not invade the adjacent structures, it is not pathologic. *Villi in emboli are not synonymous with metastases.*

To bring about a better understanding of the chorioepithelioma malignum, we might designate these cases as villous infarcts. Eleven such cases are recorded in literature: Langhans (172), Case 3, after labor at term; although no villus was present it is merely an infarct; Schlagenhaufer (174), Schmidt (176), Zagorjansky-Kissel (177), Moltrecht (181), L. Pick-Landau (180) after abortion, L. Pick (173), Schmidt (175), Burdzinsky (179, 183), Poten-Vasmer (178) after mole. The latter's case illustrates the nature of these growths very nicely. After extirpation of a vaginal nodule, and subsequent hysterectomy of the organ with the mole, a new vaginal nodule containing a villus appeared, and was successfully removed. All these patients recovered, and those of Pick and Kissel soon became pregnant again.

In an actual new growth malignancy is determined by invasion and destruction of the neighboring structures, and the tendency to produce metastases. The conception of an invasion has to be dropped in determining the tendency of the growth under consideration. The typical chorioepithelioma malignum after pregnancy is nothing else but a pathologic continuation of the normal, a generalization of the well-known physiologic, but localized process, called the "implantation" of the ovum into the uterine mucosa. A growth might be clinically malignant without showing such histologic characteristics, as for instance the papilloma of the bladder. However, in a case of chorioepithelioma malignum we deal with a growth which histologically is always malignant, but clinically sometimes benign. We attribute to the trophoblast, according to Bonnet, a kind of digestive power upon the surrounding tissues. This idea is forced upon us by the study of earlier pregnancies, the passage of iron from the mother to the child, and Polano's (222) experiments with antitoxins. All that which stamps the carcinoma as something foreign to normal structures, and makes up its destructive character, is missed in a typical chorioepithelioma.

The metastases are chiefly infarcts, for they extend mainly by central expansion. The adjacent structures are not invaded by the ectodermal cells, until the preëxistent lumen is completely filled up by the blood coagulum and the growth. In the lungs and in the brain we may find the tissues strongly compressed. The bronchial tubes appear as small slits, but nowhere are there signs of inflammation or destruction. Even the cast-off bronchial epithelium keeps its vitality, for in lung metastasis it permeates the compressed tissue in garland form (Fig. 11). On the other hand we find in some older metastases an amazing destruction of the tissues of the invaded organ. The fibres of connective tissue and the muscles are swollen to form a transparent mass, which is pervaded by large cells, which again are in a state of degeneration. Sections of the parametrium in Bacon's case show this very nicely. This same destruction, however, is also to be met in tubal pregnancy. It is, as it seems, physiologic, and aids, as it were, the advance of the trophoblast, allowing the villi of the ovum to take root in

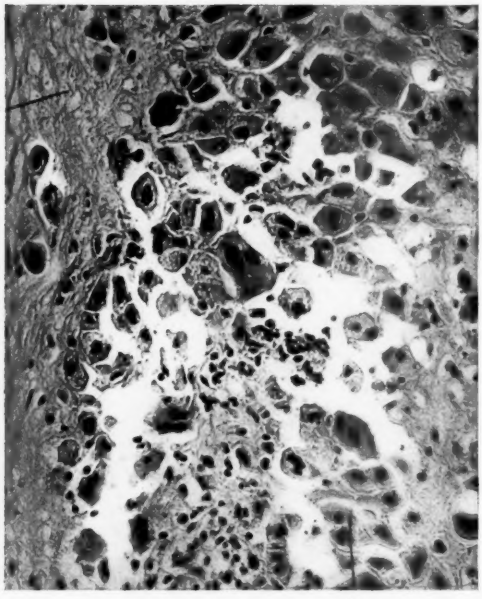

Fig. 3. Vaginal metastasis of an atypical ch., Case Fleischmann (182). No syncytium, no Langhans' cells, only large epitheloid cells. This photograph gives no general view of the atypical ch.; the section was chosen for the purpose of showing the single cells composing the growth, and their likeness to decidua cells. The original (*Monatsschrift für Geburtshülfe*, vol. 17) illustrates splendidly the arrangement of the tumor-cells around blood-vessels, similar to the following picture. Obj. ¼. Magni. 250 diam.

s. c. Syncytial cells.
f. t. Fibrous tissue of vaginal submucosa.

maternal soil. Fig. 5, a microphotogram of an early tubal pregnancy, in which a diphtheria of the throat probably had caused the death of the ovum and which ruptured 14 days afterwards, illustrates nicely the invading power of the trophoblast. The section is taken from the tube. Pregnancy was not more advanced than several weeks, the menstruation had never ceased; during the diphtheria a sudden pain in the corresponding side was noticed, and a bloody discharge set in for 24 hours. While the lower part of the picture illustrates the invasion of the trophoblast, the upper one shows the destruction and the large cells within the necrotic masses. Those parts of the tubal wall in which the destruction is more pronounced, give the same picture as the above mentioned sections in Bacon's (69) case and further they also resemble sections of Fleishmann's (182) case of atypical chorioepithelioma (Fig. 3).

Most of the authors regard the corrosion of blood-vessels by the chorionic epithelium as significant chiefly of malignant destruction. I have pointed out before that this is a false conception. The wall of the blood-vessels, as demonstrated again by Voigt's (221) pictures, may be completely replaced by large cells, which probably are tumor-cells. Hemorrhage, however, is brought about by the vacuolization of tumor-cells and subsequent invasion of blood in the vacuolated cells. A direct breaking in of tumor-cells in the blood-vessels (Risel, Fig. 4) is only rarely met with and in the specimens of my collection, showing this phenomenon, the vessel does not contain any blood.

One may notice in all publications concerning chorioepithelioma malignum the endeavor to learn the secret of the malignancy of this peculiar growth, but nearly all authors come to the conclusion that the histologic findings so far do not permit a final opinion. In a growth where the elements appear in 3 different cell-forms and which in many other respects differs from all other tumors, this naturally will prove difficult. Studying the malignant tendency of this growth, we get the impression of a complete upheaval of the significance of our old and well-known histologic marks of malignancy. We therefore are forced to return to clinical observation. This, together with the morphologic appearance of the growth in the various cases ending favorably and unfavorably, might reveal facts of prognostic value. As the connection of this growth with pregnancy is a quasi-established fact, it is only natural to compare the morphologic picture of chorioepithelioma with that presented by the invading fetal elements at the beginning and the end of gestation. Furthermore, the genetic unity of the different types demands a comparison of the varying clinical course. Such a comparison, however, is only possible after we come to a definite understanding of the denomination of the various types of chorioepithelioma.

A NEW CLASSIFICATION OF CHORIOEPITHELIAL PROLIFERATIONS

According to L. Fraenkel (42), and Marchand (144), the chorioepitheliomatous growths

are divided into typical, made up from Langhans' cells and syncytium, and atypical syncytial, consisting chiefly of large syncytial cells and syncytial masses. Some authors who were unable to arrange their cases under these 2 groups have put up another type, the transition form. This division would be very appropriate if all authors would connect herewith a definite meaning. At present one is sometimes at a loss to ascertain the true character of the growth from some of the descriptions. Cells, defined by one author as Langhans' cells, are designated by another one as syncytial cells, etc. The former name should be reserved for the sharply defined cells with a light protoplasm and a distinct nucleus and nucleolus, as we find them in the typical chorioepithelioma, surrounded and permeated by syncytium, and also to those cells, as Krebs (39) puts it, which resemble the trophoblast in a young ovum, the so-called "Zellsäulen." We also should make a distinction between plasmodium and syncytium. Syncytium is a morphologic term. Any epithelial cells might conglomerate and form syncytial masses. Plasmodium is a histogenetic term and an entity.

The typical chorioepithelioma presents a well-defined structure, which resembles the epithelial cover of villi in early stages of placentation: Langhans' cells, permeated and surrounded by syncytium, and plasmodial masses resembling the syncytial buds of the villi. So far we do not yet know a chorioepithelioma which is composed of Langhans' cells only, although in some metastases of the typical chorioepithelioma, Gebhard (31), Case 3, Hitzchmann's (94) case, Langhans' cells only are to be seen. Lately, however, through Fleischmann's (182) excellent description and illustrations (Fig. 3), we have become better acquainted with a chorioepithelial growth, which is made up of cells of the character of syncytial cells only, without any admixture of plasmodial and syncytial masses. It therefore seems to me reasonable to reserve the adjective "atypical" for this form of chorioepithelioma.

While the typical chorioepithelioma, biologically and morphologically, is equivalent to a persistence of the earliest stages of pregnancy, the atypical one resembles a picture which we find in the puerperal uterus in later stages of pregnancy. For this type the term "deciduoma" or "decidual cancer" is morphologically more significant than that of atypical chorioepithelioma, as the cells composing it resemble very much decidua-cells. An Italian author, Pinto (206), recently defined this growth as persistent decidual reaction. This renders no justice to this proliferative growth. It is not only a persistence, but also a pathologic augmentation of the so-called chorionic or syncytial wander-cells, which normally pervade the uterine muscles. Some authors have reported mitoses in the cells composing this growth. But in contrast to the typical chorioepithelioma, the atypical one consists of only one cell-form, a large syncytial cell, which looks somewhat like a decidua-cell. These cells represent, so to say, but one of the 3 types

Fig. 4. Section from uterus, placental site, extirpated on account of uncontrollable hemorrhage several months after expulsion of ovum. The walls of the blood-vessels are replaced by large cells, some of them contain several nuclei. The elastic fibres have disappeared, and the contractile vessel is transformed into a flaccid tube. (This is the cause of the hemorrhage.) Similarity of the picture with that of the atypical ch. Specimen of Dr. Waiss.

of the trophoblastic cell; they are not able to assume the 2 other forms.

The atypical chorioepithelioma, as defined above, is particularly the prototype of everything that we regard as malignant in a neoplasm. We miss the parasitic habitus of the typical chorioepithelioma, which is to be noticed in all benign growths (Virchow, Israel).

Instead we find the infectious character of the sarcoma, the growing into the tissues, the infiltration and destruction of the surrounding tissues by tumor-cells. One gets the impression that the maternal tissue, under the influence of the growth, becomes changed into tumor-cells. Yet this form of chorioepithelioma is, as proved by clinical observations, more harmless than the typical one. Relatively early complete restitution sets in and the women, as in Fleischmann's (182) and Hoermann's (184) cases (which are clinically identical), may become pregnant again and be delivered normally.

Between these 2 distinct groups of chorioepithelioma all those cases might be ranged that generally are called transition forms and better would be named syncytial forms. In this group belong all those cases, which were composed chiefly of elements like syncytial cells, assembled in groups, as well as syncytium and Langhans' cells. Such cases are H. W. Freund's (111) and the fourth case of Risel (101). An atypical case should not be called syncytial. As long as syncytium and well-defined epithelioid cells are found, we would better classify the case among the transition forms and not among the atypical, even if, in some place, the syncytial cells predominate. I am well aware that this division will not bring a perfect understanding of this proteus-like growth, but it allows a classification, which, as will be shown later, is in accordance with the clinical course.

THE RELATIONS BETWEEN COMMON AND DESTRUCTIVE MOLE, COMMON AND DESTRUCTIVE PLACENTARY POLYP, WHICH ARE LOCALIZED GROWTHS, TO CHORIOEPITHELIOMA MALIGNUM, WHICH IS A GENERALIZED GROWTH

All the 3 types of chorioepithelioma show histologic malignancy, and yet each year brings more reports of recovery from this growth, which 4 years ago was regarded as most malignant. Marchand's (144) review, in 1895, of chorioepithelioma, showed only 4 recoveries among 28 cases, while Teacher's (51) statistics of 188 cases, in 1905, gives 65 recoveries. Judging from the tendency of a chorioepithelial formation, we are placed in the queer position to differentiate between excessive physiologic and excessive pathologic proliferations. So far we still need a standard for the physiologic proliferation of the trophoblast. The few specimens of early pregnancy at our disposal do not yet permit us to draw a line. Bossi's (210) pictures of interstitial pregnancy, for instance, show an amazingly deep invasion of chorionic cells and villi into the muscles. We know that the trophoblast may sometimes strike very deeply into the uterine muscles, although the cause for this is still unknown. The so-called decidual metastases and the adherent placenta are probably nothing else but pathologically deeply rooted fetal structures.

All authors that have examined uteri with adherent placental rests, state that there is to be found an excessive invasion of the villi into the muscles. Moreover, Bauereisen (207) recently pointed out again, that there is no decidua to be found in the neighborhood of such villi. The villi and their epithelium imbed themselves, just as in chorioepithelial proliferations, directly into the muscles. It does not happen so very rarely that the placenta cannot be separated without loss of musculature. But such an invasion of the villi cannot be referred to as "deportation." This term is not used in this paper in the sense of Veit (204), who introduced it. While this author designates every pathologically deeply penetrating villus as "deported," I differentiate, in accord with Schmorl and others, between "invasion" and "deportation," comprising by this latter term, villi, deported by the blood-current to a place distant from the placenta. The invading villus has reached its place by its own growth, while the deported villus is carried away by the blood current.

In perfect accordance with the occasional occurrence of villi pathologically deeply inserted into the uterine muscles, is the persistence of fetal cell-masses in the uterus for some weeks after labor. I purposely evade the discussion of the question why the chorionic epithelium

proliferates in one case more than in the other one. This is an entirely unexplored territory, allowing all kinds of theories. Excessive invasion of villi and persistence of chorionic epithelium for some time after labor have, on account of their frequent combination with proliferation of the villous epithelium, also been the cause of unnecessary removal of the uterus. These findings render differentiation between chorioepithelioma malignum and harmless remnants of abortion very difficult. As long as these conditions are not cleared up completely, many a woman will have to sacrifice her generative organ to our lack of knowledge.

Our experience shows us that such limited proliferations are clinically comparatively benign. The limitation of the chorioepithelial growth to the placental site, its physiologic place, will therefore be essential in determining its malignancy. In vesicular mole the whole uterine surface forms the placental site. This fact is generally not considered sufficiently. Just as little are we justified in speaking of a chorioepithelioma outside of the placenta, when the growth developed within the uterine muscles and is covered by an intact mucosa, as in Findley's (126) and Holzapfel's (110) cases. Here the continuity between the chorioepithelial proliferation and the ovum has only been interrupted.

Such proliferations at the placental site correspond clinically and histologically with that condition which has been named by older writers — v. Kahlden (199), Zahn (194) — destructive placentary polyp. Though this name may not seem correct, anatomically, it gives us at least a definite clinical conception. It is well known that in molar pregnancy villi invade the uterine veins, and at times may pervade the whole thickness of the uterine muscles. Out of this knowledge grew the significance of a destructive hydatid mole, and yet only a small part of these patients are subsequently affected with chorioepithelioma malignum. Among 10,200 labors, observed in the Berlin "Frauenklinik (Olshausen)" Gebhard (239) found reports of 12 cases of vesicular mole (hydatid mole). Later investigations proved 10 of the patients to be perfectly well and the other 2 could not be traced, as they had emigrated. Vesicular mole is peculiar to the pre- and postmenstrual years of the female. A woman might have a vesicular mole 3 times, Warman (219), or even 4 times as reported by Fritzsch (230), without subsequent chorioepithelioma malignum. Again a new pregnancy, following a molar pregnancy, might end in a normal lying-in period, or, as in some cases, lead to the development of the most fatal malignant chorioepithelioma.

Very instructive is Solowij's (68) and Krszyszkowski's case of destructive mole, in which deported villi lead to an occlusion of the ovarian vein and of branches of the pulmonary artery. The woman died 10 days after partial removal of the mole. In the infarcts of the lungs chorionic wander-cells penetrated the wall of the blood-vessels and in some places, where an embolus was impacted at the bifurcation of a blood-vessel, its walls were partially necrotic. The uterus showed an immense invasion by the vesicles of the mole; in fact so much that the destruction, which is seen in some parts of the muscles, might as well be taken as the result of mechanical force. Although the whole case gives the impression of malignancy, it is expressly stated by the author that the chorionic epithelium covering the hydatid villi showed comparatively little proliferation, even in some of the infarcts. We are therefore not justified in calling this case a malignant chorioepithelioma. It is merely a highly destructive mole. This and Gottschalk's case are the only ones in which villi were found in the lungs. The latter case was one of typical or rather syncytial chorioepithelioma, leading to death several months after extirpation of the uterus. One might feel inclined to regard Solowij's (68) case as one like Gottschalk's (86) case, except in the earlier stage, and thus would be justified in considering it a beginning malignant chorioepithelioma.

Even a highly destructive mole may heal spontaneously, as shown by a case observed by Dr. G. Schirmer in Chicago. The case was briefly as follows:

Miss R., nullipara, last menses August, 1903. *Status* November 10: Two weeks before she was taken with intense pain in her left side; fundus uteri on a level with the umbilicus and small. In the left side of the abdomen, parallel with the uterus and entirely separated

from it a tumefaction was to be felt. It passed in the form of a column from the pelvis upward to the thorax, where it abruptly disappeared posteriorly. It was as thick as a man's thumb and sensitive on pressure. Vaginal and rectal examinations showed the left parametrium occupied by a tumor, which was made up of a conglomeration of vermiform swellings. This tumor had a varying consistency, was not to be separated from the cervix, and merged with the above described abdominal tumor. The right parametrium was perfectly free, the cervix admitted one finger, and there was a brownish, thick, slimy discharge, but no clots. Temperature, 102°. Dr. S.'s diagnosis was hydatid mole, and deportation of villous masses, leading to thrombosis of the plexus pampiniformis and vena ovarica, up to the vena renalis. The patient was sent to a hospital, where she was treated by vaginal douches and Priesnitz compresses. The highest temperature recorded was 102.5°. In the beginning of December she returned home. On December 21st profuse hemorrhage set in, and Dr. S. removed a hydatid mole. For 6 weeks there was continuous fever, but the uterus remained free from infection. May, 1904, she was perfectly well.

Few text-books make the above-mentioned strict differentiation between localized chorioepithelial proliferations and a chorioepithelioma malignum, as for instance Fritsch in his *Gynecology* and Henkel in his *Diagnosis in Gynecology*, also Olshausen and Williams in their text-books on obstetrics. The latter author, who formed his opinion on personal investigations, gives a much better illustration of this subject than many text-books of pathology.

Moreover, the same opinion had been pronounced previously, 1894, by L. Fraenkel (2), who said that the destructive placentary polyp and the destructive mole are in the pathologic-anatomical sense not malignant, as they do not cause metastases. They have only "a local malignancy." Both forms lead to hemorrhage. This same symptom we meet in the common placentary polyp after abortion as well as after labor at term. The source of the hemorrhage is in each case from maternal blood-vessels remaining patent. The villous epithelium is well preserved in placentary polyps and shows sometimes distinct proliferations. *The persistence of viable chorionic epithelium sustains the hemorrhage, and keeps the blood liquid in the center of the polyp.* Marchand's previous statement, that chorioepithelioma causes coagulation cannot be maintained any longer. The plasmodial structures rather possess the ability to prevent coagulation. Only necrotic chorioepithelial cells, as demonstrated again by Hitschmann (216), undergoing fibrinoid degeneration, cause coagulation. During the operation of a chorioepitheliematous growth the blood rushes out as from a sponge, even tamponade is sometimes without avail. Some authors, therefore, suggested that the blood of such patients is deficient in fibrogenous substances. This is not so. The principal cause for hemorrhage is to be seen in that chorioepithelial cells, as can also be seen in ovarian and tubal pregnancy, may replace the wall of blood-vessels completely; *more than this, the elastic fibres disappear and the contractile blood-vessel is transformed into a flaccid tube* (Fig. 4).

As a rule such a placentary polyp is easily removed by a slight pressure exerted upon its insertion with the finger. Sometimes, however, we find that the villous elements have grown into the uterine muscles. A separation is not possible unless muscles are removed too. *It is this excessive penetration of villi into the muscles that renders the placentary polyp destructive.* The villi cannot escape from the surrounding muscles. Hemorrhage is brought on in the same way as in the common polyp, but the hematoma is formed within the muscles. The same conditions are present in a destructive mole. The muscles are permeated by chorionic wander-cells, but Langhans' cells and syncytium are only to be seen in connection with the villi. A curettage will not be of great use in such cases. Even the finger is not able to remove such villous masses grown into the deeper layers of the muscles. The removed placentary polyp is soon replaced by a new one. The permanent loss of blood forces us sometimes to extirpate such an uterus, but we do not deal in such a case necessarily with a malignant growth in the pathologic sense. It is merely a local tumor.

Thus the relatively favorable outcome of all those cases described as chorioepithelioma, in which villi were present, is readily understood. If this invasion is an excessive one, if villi pervade the musculature close to the peritoneum, then the physiologic involution of the uterus, together with the persistent, augmented inside pressure in the hematoma, will be sufficient to bring on a necrosis of the peritoneum and,

as observed in some cases, lead to intraperitoneal hemorrhage — the cases of Lomer (166), P. Gottschall (191), Noble (123), Jarotzky-Waldeyer (197).

We should not speak of a chorioepithelioma malignum, unless we find chorioepithelial proliferations within the muscles independent from villi. Only an excessive invasion of the musculature by syncytial wander-cells and subsequent destruction of the muscle-cells justifies the diagnosis of atypical chorioepithelioma. The mere presence of chorioepithelial cell-masses inside of veins is no proof of malignancy. Only an autonomous tumefaction, independent of the maternal soil, the villi, permits the term chorioepithelioma malignum. The destructive hydatid moles as well as the destructive placentary polyps do not give metastases, but they might lead to embolism of the lungs and villous infarcts of the vagina, Poten-Vasmer (178). In this group belong all those cases in which the autopsy has revealed no metastases. A classical case of this type is that of Bonnaire and Letulle (189), after destructive mole. The patient died of anemia soon after total extirpation of the uterus. The paper written by these authors contains very instructive colored pictures, which demonstrate wonderfully the difference between abundant infiltration with wander-cells and atypical chorioepithelioma.

Matters are different, when outside of the placental site, be it in the cervix or vagina, a chorioepithelial focus is to be found. Its presence points not only to a deportation, but renders an independent proliferation of the deported masses probable. To the excessive proliferation is added the conception of metastasis, which completes the picture of malignancy. In such a case we should desist from any operative removal of the diseased organ, except under definite conditions. We even have to demand that the pathologist and clinician disprove malignancy. It will be evident, from what I have said above, that not every chorioepithelial node is malignant. Contrary to Risel (158), I maintain that benign vaginal infarct, where the proliferation rises from a deported villus, lying inside of a vein or a blood-clot, does not show histologically more malignancy than remnants after molar pregnancy. Malignant metastases present quite another appearance. Villi are mostly absent and anyone taking pains to examine the surrounding structures will find isolated foci of Langhans' cells, distinctly proliferating in the vaginal mucosa as well as into the deeper layers of the paravaginal tissues. This same observation has been made by other authors. Langhans (172), for instance, points out the preponderance of Langhans' cells in his first fatal case, while the vaginal metastasis in his third case contained only necrobiotic chorioepithelial masses. Moltrecht (181) also from the morphologic appearance of the vaginal node came to the conclusion that he had to deal with a localized growth.

DIFFERENTIATION BETWEEN MATERNAL AND FETAL CELLS ESSENTIAL FOR THE PROGNOSTIC VALUATION OF CHORIOEPITHELIAL PROLIFERATIONS

The absolute malignancy, histologically, of all physiologic and pathologic chorioepithelial proliferations, as demonstrated, at present renders a prognostic valuation of the microscopic picture impossible. I pointed out before, that pregnancy ought to furnish the physiologic paradigma of the chorioepithelioma. However, until the question of the relations between fetal and maternal cells at different stages of pregnancy is definitely settled, we can hardly expect to put up valid histologic marks. The study of early stages of pregnancy, tubal and ovarian, will help to answer the question, whether we have to deal with fetal or maternal cells, as their picture is not disturbed by a continuous decidua. A differentiation and classification of these cells will be attempted in what follows:

In the immediate neighborhood of typical chorioepithelioma as well as in the vicinity of villi, either in uterine, tubal, or molar pregnancy, we notice smaller and larger cells, whose whole appearance gives the impression of heterogeneous elements, of cells that seem not to belong to the maternal tissue. All these various cells are comprised by the names "wander-cells, chorionic wander-cells, ectodermal chorioectodermal syncytial wander-cells." As their different names show, the various authors do not agree upon their nature. Older authors, as Saenger (33), took them for decidua-cells,

Fig. 5. Section from wall of tube in very early ruptured tubal pregnancy, demonstrating the immense invading power of the trophoblast. Villi are not yet formed. One notices among the dark stained trophoblastic cells some larger ones, which have undergone a plasmodial change. In the right and lower part, the sprouting of the trophoblast is manifest, while in the upper half of the picture, larger, irregularly shaped cells, which are not stained so deeply, may be noticed lying between necrotic muscle fibres. The nature of these cells is still discussed. Minot calls them hypertrophic, degenerated, trophoblastic cells. Object. $\frac{2}{3}$. Magni. 175 diam.

t. Trophoblast.
p. c. Plasmodial cells.
h. d. Hypertrophic, degenerated, trophoblastic cells.
d. f. Degenerated, necrotic, fibrous tissue of the tube.

while most of the modern writers regard them as fetal elements. The truth lies between both theories. One group of maternal cells, I think, we may easily distinguish by differential stain, they are the mast-cells and plasma-cells, which are to be found in great numbers in tubal pregnancy. But even their nature is still disputed. Askanazy (240) has lately shown that young connective-tissue cells, osteoclasts and endothelial cells may present, in a young, active stage, the same basophile granulations. The same may be said of the trophoblastic cells and especially the plasmodial cells that show a great affinity for the red, when subjected to the Unna stain.

When villi advance upon maternal tissue with their cell-columns, the regularly shaped Langhans' cells soon lose their distinct form. Invading the tissues they assume a spindle form (Fig. 5), so that they are not to be differentiated from the connective-tissue cells except by their greater affinity for stains. We may say about these ectodermal cells what Krompechner (231) states about the basal cells of the epidermis: "Young connective-tissue cells and basal cells show frequently the same structure; it is therefore understood that the

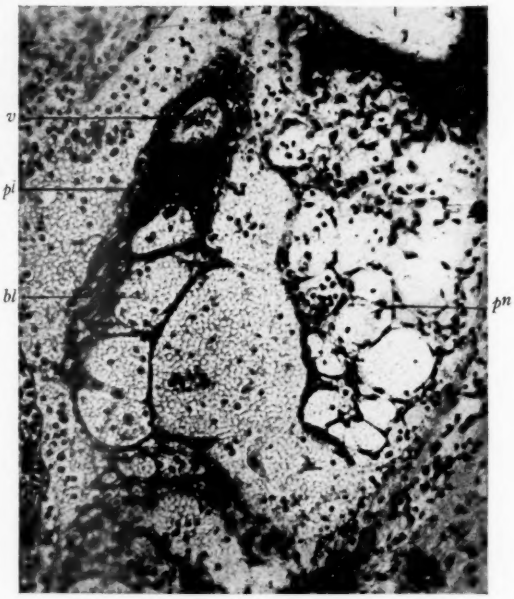

Fig. 6. Section from an ovarian pregnancy (author's case). On the right side of the picture two villi are seen. The cell-cover of these villi has grown out to a big network; the plasmodial masses have become vacuolated and form blood-channels. Between the meshes are lying well-preserved blood corpuscles; all over the picture are isolated fetal cells with a distinct plasmodial character. Object. $\frac{1}{2}$. Magni. 60 diam.

v. Villus.
pl. Plasmodium.
p. n. Plasmodial network.
bl. Blood corpuscles.

boundaries between the basal epithelium and the young connective tissue are often indistinct, that the epithelial cells become successively lost in the connective tissue." Voigt (221), who recently studied these cells in serial sections, denominates them "cell-filaments," representing the most delicate radicles of the villi. Studying these cells more closely, we notice some of them undergo a syncytial or rather plasmodial change; they become larger, the nucleus and protoplasm stain much deeper, and their coloring and structure assumes an appearance which resembles that of syncytium. However, they are not descendants of the syncytium, but derivatives of the Langhans' cell, finest sprouts, that undergo a plasmodial change. We find them in early stages of tubal pregnancy, already at a time and in places, where there is no syncytium to be found (Fig. 5). Winkler's (63) "syncytioblasts," Webster's (202) "unknown cells," are probably the same cells. In other places we see the trophoblastic cells grow out to larger cells. They are lying together in groups, lose the habitus of Langhans' cells and resemble decidua-cells more than any other. Some of the so-called "decidual islands" are possibly nothing else than advanced, hypertrophic, trophoblastic cells. Similar cells with the habitus of decidua-cells are found in the vaginal metastases of the typical chorioepithelioma and are best demonstrated in fresh teased preparations. I gave in my previous paper (4) Fig. 2, pictures of these cells, and named them syncytium, which statement I would like to correct in the above sense. These cells show distinct sprouts and, as I said before, resemble in their epithelioid character the decidua-cells more than any other cells. Between these enumerated morphologic variations of trophoblastic cells, spindle-formed cells, plasmodium, Langhans' cell, and decidua-like cells, there exist all kinds of transitions, but one point is common to all and that is the absence of all necrobiotic signs. These cells have a distinct proliferative character.

As long as these cells show such a pronounced vitality, we have no reason to doubt their ectodermal origin, and, further, their connection with villous epithelium is easily proved by serial sections. Besides these progressive cells we find others in the neighborhood of villi that

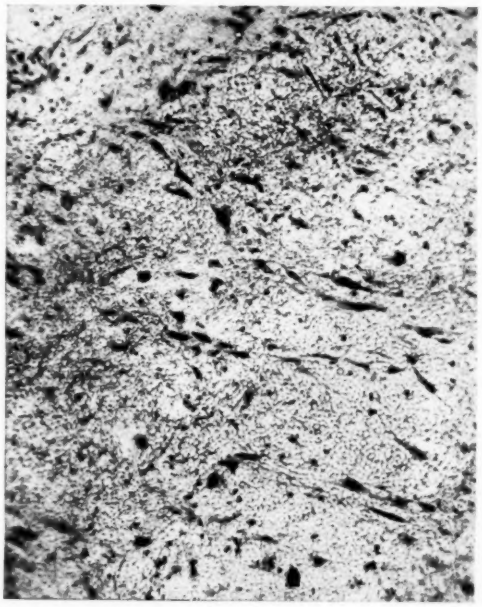

Fig. 7. This picture is taken from the same section as No. 6., a little farther away from the villi. Chorioepithelial cells with distinct plasmodial character advance through well-preserved blood. Compare these cells with the trophoblastic cells in No. 5. Object. $\frac{1}{4}$. Magni. 150 diam.

show symptoms of ended cell-life. I pointed out before that in the immediate neighborhood of villi, as well as in certain forms of chorioepithelioma, a distinct destruction of the maternal tissue is to be noticed. Between the necrotic fibres and muscles, we find besides the deeply colored trophoblastic cells, larger cells, whose boundaries are not well defined, and whose nucleus and cytoplasm show about the same affinity for stains. Their indistinct character suggests ended cell-life, and Minot (218) justly speaks of them as "hypertrophic degenerated trophoblastic cells." The marginal parts of Fig. 5 show some of these indistinct cells. They are found regularly in tubal pregnancy and seem to precede the invading trophoblastic cell-mass. In some parts they are so abundant that a picture results similar to that of the atypical chorioepithelioma. The single cells are not quite as large as in Fleischmann's specimen, but the structure of the nucleus and cytoplasm are the same. *This great*

likeness again makes it very probable that the true atypical chorioepithelioma is only a later stage of the other forms, in a similar way as the syncytial cell is a later stage of the trophoblast and of its derivatives, the Langhans' cell and the syncytium.

Some more difficulty arises in the differentiation between maternal and fetal cells, when we find the wall of a blood-vessel completely replaced by large cells, decidua-like cells (Fig. 4). At times, for instance in tubal pregnancy, we see the invading trophoblast in direct connection with these cells, or we observe their breaking in, at other times we find no connection at all. While in pregnancy every large cell is taken for a decidua-cell, a maternal cell, in chorioepithelioma, under the influence of Marchand's school, most of the German authors carefully avoid this term — contrary to Italian authors, Pinto (213), Doria (235). Many of these cells are of fetal origin, but others are merely maternal cells, connective-tissue cells, or adventitia-cells that have undergone a decidual reaction. We find decidua-like cells in places so remote from the uterus, as for instance in the decidual nodes of the peritoneum which always surround a lymph-vessel, that a mechanical transport never will explain their presence. We have to admit a fetal and maternal decidua, but differentiation is not always possible.

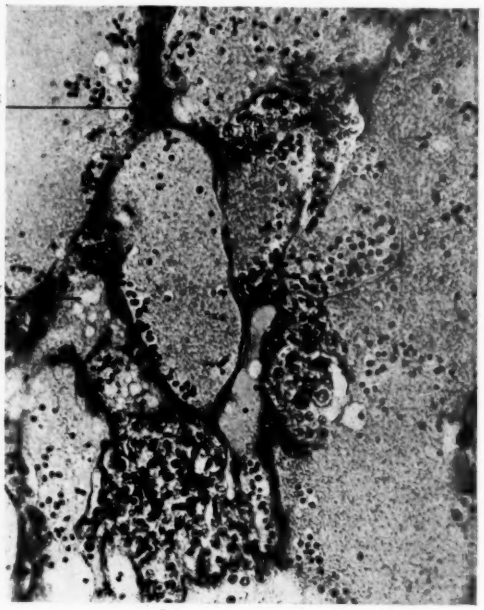

Fig. 8. Section through metastasis of typical ch. in brain, the same case as No. 1. The plasmodial masses have grown out to a network, whose meshes contain well preserved blood; similarity of the arrangement with that in ovarian pregnancy, No. 6. Note the appearance of distinct Langhans' cells at the points where the meshes interlace, a sign of highest malignancy. Object. $\frac{1}{2}$. Magni. 160 diam.

l. c. Langhans' cells.
g. Glycogen.
pl. Plasmodium—forming network.

The last two described varieties of cells form the transition to another larger group, the so-called puerperal wander-cells, also named syncytial wander-cells. This name, however, only points to their affinity for stain, which is the same as in syncytium. Their main feature is that of ended cell-life. They are found chiefly in the puerperal uterus, and therefore I would like to contrast them with the first described group of progressive trophoblastic cells, found in living pregnancy. In reality there is no contrast between these two groups, as the puerperal cells represent only the ultimate stage of the pregnancy-cells, the trophoblastic cells. Both are found in chorioepithelioma and their differentiation, in my opinion, might help to establish malignancy or benignity in chorioepithelia proliferations. Marchand has studied these cells especially, and in his paper *The Hydatid Mole* has pointed out their varying size and their polyhedric and club-shaped form. They grow out at times to big giant-cells, containing several nuclei, as for instance the serotinal giant-cells, containing a number of slightly stained nuclei with a distinct network. All these puerperal wander-cells give the impression of ended cell-life. The pycnotic condition of their nucleus speaks against any proliferative tendency.

In the typical malignant chorioepithelioma we find these oddly-shaped, deeply-stained and often not distinctly-bounded, irregularly-nucleated cells only in those places where tumor-tissue is disintegrating. We notice them especially in older metastatic foci, in the parametrium or vagina. Whether they are found constantly in early stages of living pregnancy is not yet

Fig. 9. Invasion of uterine muscles by fetal cells, puerperal wander-cells. From an abortion, mens 5, with postpartum hemorrhage, removed manually (author's case). Note the direction of the cells transverse to the muscle fibers, and the destruction of the latter. These cells have no proliferative character. The lower part of the picture corresponds to the placental site, the dark, indistinct masses are thrombi. Object. ½. Magni. 8 diam.

p. w. c. Puerperal wander-cells.
t. w. c. Trophoblastic wander-cells.
m. Uterine muscles.
th. Thrombus.

decided. They are abundant in the destructive mole and placentary polyp, and also to be seen in ruptured tubal pregnancy. In the puerperal uterus they are found, too, but not constantly. Some authors claim that they are always present in the first days after labor, while others did not succeed in finding them in any of the uteri examined for them. Their presence and also vitality has been viewed differently by the various authors. Kworostansky's (234) investigations have opened a new perspective. He succeeded in demonstrating these "fetal" elements in 18 out of 22 puerperal uteri. Furthermore he found these wander-cells to grow richer in all those cases in which the circulation or nutrition of the placenta was somehow disturbed. This strange phenomenon is easiest explained in this way, that the same disturbance in the placentary metabolism which leads to a persistency of these cells, causes their deeper invasion into the uterine muscles. The discovery of similar cells in the uterine decidua of extra-uterine pregnancy — B. M. Schmidt (230), Dungern (44) — speaks certainly in favor of their maternal origin. Again, when we compare the appearance of these puerperal wander-cells in a stage, as for instance in Bacon's (66) specimen of the uterus, with that of syncytial buds in a common placentary polyp, we are impressed by the similarity of the picture. Both times the cells have lost their boundaries and large heaps of nuclei are all that remain.

Sections of uterine muscles (Fig. 9), which I removed manually, in a case of severe hemorrhage following the spontaneous expulsion of a 5 months' ovum, show an abundance of wander-cells, besides isolated foci of Langhans' cells. They resemble completely some of Voigt's (221) microphotograms, demonstrating the invasion of maternal tissue by the trophoblast. In both pictures one notices the strange direction of these cells, transverse to the muscles. A closer study of Picture 9, will reveal the great variety in the form of these wander-cells. From the spindle-shaped cell, resembling the trophoblastic cell, one finds all transitions to the syncytial cell, the serotinal giant-cells and up to mere cell-heaps, their end stage.

Lately more interest has been taken in the formation of giant-cells. Connective-tissue and also muscle-cells may, as well as epithelium, grow out to giant-cells through re- and degenerative processes. However, so far we still want means of differentiation as to their origin. C. Pinto (213) observed such giant-cells within the uterine muscles regularly during the first half of pregnancy. From the fifth month on they are supposed to disappear gradually. He, as well as Veit, regards them as of maternal origin, as a kind of decidual reaction against the progressing ovum. Heinsius (238) lately advanced the view before the Berlin Gynecological Society, that most of these puerperal wander-cells are of maternal origin, but

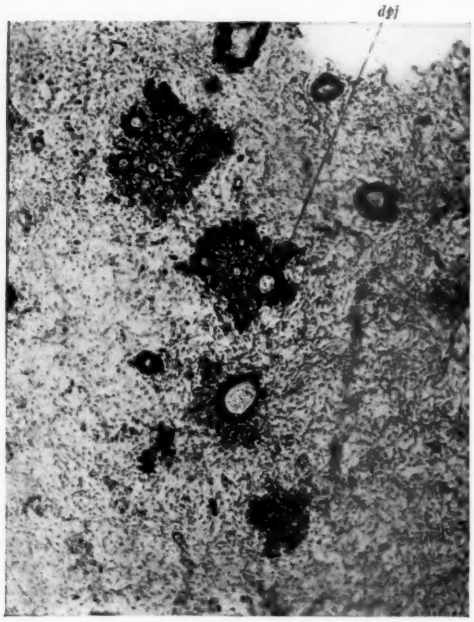

Fig. 10. Section through the outer part of the ovary, typical ch. (author's case), showing follicular degeneration. Absence of lutein cysts and lutein degeneration. Object. ½. Magni. 80 diam.
d. p. f. Degenerated primordial follicles.

he met with general opposition. Most of the serotinal giant-cells, as well as those found within muscles, are chorion-ectodermal cells, as we may infer from their vicinity to villi. Connective-tissue cells undergoing decidual reaction, certainly might assume the same appearance.

The invasion of connective-tissue by epithelial cells is frequently regarded as absolutely malignant. Anyone interested in this matter should read the numerous and thorough publications of Leo Loeb (223), upon transplantation of skin. Loeb shows that regenerating epithelial cells are not only able to penetrate connective tissue, but also true cartilage. Further, they exert a distinct destroying influence upon these tissues. Loeb's experiments facilitate the understanding both of the immigration of chorion-ectodermal cells into the uterine muscles a great deal, and of their subsequent degeneration and conglomeration into giant-cells. Loeb shows that an epithelial cell-complex, when transplanted into connective tissue previous to its death, forms giant-cells. As in the oddly-shaped syncytial wander-cells we notice in his pictures that the boundaries of the single cells disappear before they conglomerate. In the same way the serotinal giant-cells develop out of heaps of advanced trophoblast cells, which through the death of the ovum have been retired.

HISTOLOGIC MARKS POINTING TO MALIGNANCY OF CHORIOEPTHELIAL PROLIFERATIONS AND THEIR PROGNOSTIC VALUE

Whether syncytium undergoing necrobiosis may form cells of the character of the puerperal wander-cells, is not yet proved. In the transi-

Fig. 11. Section from metastasis in lung, typical ch. (author's case). A more solid part of the growth; tumor-tissue advanced against a bronchus. Bronchial epithelium is well preserved. The tumor-tissue consists of Langhans' cells and larger plasmodial masses; absence of blood. Object. ½. Magni. 150 diam.
l. c. Langhans' cells.
b. e. Bronchial epithelium.
syn. Syncytium.
f. deg. Fibrinoid degenerated chorioepithelial tissue.
All microphotographs are made with Bausch and Lomb's microscope by Dr. Knapp.

tion forms of chorioepithelioma and also in localized growths, we frequently meet pictures that speak in favor of a transformation of syncytium into syncytial cells. We see large cells with a more or less dark cytoplasm, the nucleus of which shows odd forms as in the puerperal wander-cells, but more often the cytoplasm is light, transparent, and the nucleus, as in the Langhans' cells, shows a distinct network and nucleolus. But they are much larger than the Langhans' cells. The syncytial masses partly in the transition stage to the large syncytial cells are lying on one side, while at the other side of the section we may find syncytial cells only, and some of them might present the appearance of the Langhans' cell proper. What we miss in these forms is the regularity in the arrangement of the true syncytium and true Langhans' cells, which is only to be found in the true typical chorioepithelioma. The latter may show all the other stages, but the transition forms only rarely will present typical Langhans' cells surrounded and permeated by syncytium.

The adjacent uterine muscles, partly destroyed in this form of chorioepithelioma, are in most cases invaded by numerous cells of the habitus of puerperal wander-cells. In some benign cases only a few puerperal cells were to be found, in others, none, as for instance in the first case of Dunger (130). This is no argument against our deductions. As their whole appearance gives the impression of ended cell-life, they naturally will disappear sooner than the large syncytial masses and the big syncytial cells. In perfect accordance herewith is that the so-called puerperal wander-cells are only to be found within a certain period after labor, and also their complete absence in some cases. As stated by Petersen (226), Becker was the first to express the opinion that the appearance of giant-cells in carcinomatous growths has to be regarded as a kind of healing process. It is not so absurd to apply this view to one group of chorioepithelioma, namely the atypical one, and also to all localized proliferations. Velitz (167), after comparing the microscopic picture of 22 well-defined cases described as atypical (in Marchand's sense), comes to the conclusion that they are less malignant. I have always had the same impression. Patients suffering from chorioepithelioma do not always die from the tumor. We have become accustomed to regard the death of the patient as a criterion for the malignancy of these growths. A statement of the real cause of death that is free from all objections is frequently wanting. A patient with chorioepithelioma may easily perish by pulmonary embolism. Very often infection from the constantly bleeding metastases sets in. The cases of Bacon (69), Anders (57), Apfelstedt, Aschof, (39), Graefe (186), Fraenkel (25), Krebs (71), and Hammerschlag (76), died of sepsis. When patients succumb to chorioepithelioma, it is chiefly the permanent loss of blood, external, as well as internal into the growth, which causes death. I previously called attention to the relatively great deficiency of blood pigments, existing in the deeply saturated structures of this growth (*Zeitschrift für Geburtshülfe*, vol. 49, No. 3, page 24). Whereas the leukocytes by their absorption of blood commonly bring about the formation of hemosiderin, as will be noticed in all cases of ruptured ectopic pregnancy, the chorioepithelial elements in chorioepithelioma malignum assimilate the iron and also the pigment of the red-blood corpuscles so thoroughly that hardly any crystalline products remain. This is demonstrated by those cases where hemorrhage from the genitalia was entirely absent. In Halliday Croom's (24), case — three months amenorrhea patient 45 years old, metastases in the labium majus and vagina, and general metastases — the author points out — autopsy confirming — that the woman was profoundly anemic and cachectic. Both Krewer's (21) first case of generalized, typical, malignant chorioepithelioma, with no hemorrhage and still excessive anemia, and also E. Fraenkel's (26) case prove that the growth of syncytial masses *per se* is sufficient to produce grave anemia.

Another statement of Velitz that the wander-cells in the neighborhood of chorioepithelial growths have to be regarded as products of degeneration of chorion-ectodermal cells, and therefore permit a favorable prognosis, has justly been repudiated by Fleischmann and Hoermann. This statement cannot be maintained in its broad sense, for it can be applied only to that group of cells which resemble puerperal wander-cells. And, as pointed out be-

fore, the discrimination between hypertrophic, degenerated trophoblastic and necrobiotic puerperal wander-cells, is not always possible since we are not always able to differentiate the invading trophoblast from the connective-tissue and other cells. Most of the wander-cells in benign chorioepithelioma are doubtless necrobiotic, as Velitz assumes, but we have to recognize that the same healing influence of the maternal organism can be noticed in all the different types of chorioepithelioma. Consequently they will not permit absolute conclusions upon the outcome of the case. I still adhere to my previous statements (l. c.) that the initial stage of the typical, malignant chorioepithelioma has to be seen in those isolated cells found in the immediate neighborhood of the growth. The fetal cells invading lung-tissue offer the same indistinct appearance as the trophoblast in tubal pregnancy.

Velitz is so far the first author who undertook histologically to differentiate benign from malignant forms of chorioepithelioma. Kruckenburg (162) tried the same, but like all other authors, with a negative result. He, however, did not include in his discussion those cases in which the uterus was found free from growth. According to Velitz, spontaneous recovery is brought about by necrobiosis which becomes manifest by the diminished vitality of the Langhans' cells, absence or scarcity of mitoses, and the appearance of numerous wander-cells. Necrobiosis is something that belongs to all rapidly-growing tumors and is found particularly in the typical cases with general metastases. To determine the vitality of the Langhans' cells by the number of mitoses would be certainly of great value, but it depends on so many accessory circumstances as infection, fixation, etc. In my opinion we do not need this indicator at all. The simple presence in larger numbers, and their appearance in foci between the muscle-cells, will always be sufficient to declare the case malignant. The Langhans' cell is always the chief proliferating part of a chorioepithelioma. I agree with Langhans, who in opposition to Marchand, adheres to the theory that the chief part in the embedding of the villi and also in the growth of a chorioepithelioma has to be attributed to the Langhans' cells and not to the syncytium. Wherever Langhans' cells are lying in open blood spaces, the peripheral parts undergo syncytial changes. Plasmodial buds, as we meet them in early placentation and plasmodial giant-cells, which we see in the typical chorioepithelioma, are only to be found in free and liquid blood. Voigt (221) comes to the same conclusion and says in his paper, "The relation between fetal and maternal cells," is as follows: "Masses of protoplasm, which could be taken for descendants of the cover-layer plasmodium, are only to be found on open surfaces as cover of villi and as cell-bands within the intervillous spaces."

A comparison of the microscopic picture of the various cases gives us the impression that the prognosis depends upon the richness in Langhans' cells. The more Langhans' cells, the worse the prognosis. Among the many falsely called atypical cases with recovery, syncytial in my classification, a great number is found in which the syncytial change of the Langhans' cells, and the transformation of the syncytium into syncytial cells, preponderates in the histologic picture and where only very few foci of Langhans' cells can be discovered.

Of great importance is the appearance of fresh blood in the surroundings of the growth, and also the formation of blood-channels within the vacuolated cell-masses. Only dead or chorioepithelial tissue causes coagulation, undergoing at the same time a fibrinoid change. The atypical case bleeds, because the wall of the blood-vessels permeating the chorioepitheliomatous tissue are replaced by large cells, probably chorionectodermal cells. Besides this we find in the typical and syncytial chorioepithelioma a direct destruction of blood-vessels and hemorrhage into the neoplastic tissue. The serotinal giant-cells are no longer able to proliferate, but the plasmodial masses of a typical chorioepithelioma are. There are no plasmodial buds and giant-cells to be found in a mature placenta except in some cases of eclampsia. Throughout most of the publications on chorioepithelioma, from Marchand on, can be traced the more or less frank statement, *that true Langhans' cells may develop out of plasmodial masses. This phenomenon points, I believe, to the malignant and proliferative tendency of the typical chorioepithelioma more than anything else in contradistinction to*

the syncytial and atypical form. Although this is not an established fact, the mere impression we get from the histologic picture suffices to stamp the case most malignant. A similar arrangement of typical plasmodium and typical Langhans' cells is only to be found in early stages of living tubal and ovarian pregnancy, and also in the teratoid chorioepitheliomatous proliferations of the male. The presence of real plasmodium, when not in connection with villi, must always be regarded as a sign pointing towards malignancy of the growth. There is no doubt, in my opinion, that an uterus with chorioepithelioma gives a different histologic picture, in a case ending with recovery, from the picture in a case which died later on of metastases. However this is a diagnosis "*post festum.*"

Comprehending what has been said above, we come to the conclusion, that from all the customary marks of malignancy, strictly taken, only those of actual new growth and metastasis are reliable. We have to exclude all cases of invasion and deportation of villi, villous infarcts with simply proliferated epithelium, and benign vaginal metastases, as not being malignant. Those deeply penetrating proliferations limited to the placental site, destructive placentary polyp, possess only a local malignancy. It is of course understood, that such women might die of sepsis or exsanguination. Again a placentary polyp, without villi, of wholly cellular structure, is as Austerlitz' (92), and Reeb's (81) cases show, a sign of true neoplasm and malignancy. The appearance of a tumor outside of the placental region, points always to malignancy, unless it is a benign metastasis. Infiltration of the surrounding tissues by chorionic wander-cells permits an opinion of benignity under certain conditions only. Those are as follows: (1) The wander-cells must have the appearance of those found in the puerperal uterus; they should appear in rows and be accompanied by so-called serotinal giant-cells, and (2) absence of other signs pointing to malignancy. *The assemblage of well-defined cells of the character of those forming the Langhans' cell-layer, no matter what size and form, amongst healthy tissue or true plasmodium, is, when found several months after expulsion of the ovum, an unmistakable sign of a boundless growth.* The true atypical cases, composed of cells of the character of chorionic wander-cells and giant-cells only (no plasmodial masses), permit of a favorable prognosis. In syncytial cases the prognosis is the better the more the syncytial masses and cells prevail. Conversely the preponderance of Langhans' cells has to be taken as a sign of progressive and malignant character.

Another question is whether these histologic marks are of practical value or not. Only in easily removable metastases, as for instance vaginal, and in scrapings, when parts of the muscles have been removed, will they serve as a guide for operative interference, and that means that they will rarely be of value. More difficulty arises from the fact that this growth is subjected to a persistent influence by the maternal organism. The presumptive metastasis, accessible to the knife, may show necrobiotic changes and may contain abundant syncytial cells, and still the chorioepithelial growth may progress at another place. In Lindford's (6) case the vaginal metastasis was successfully removed, and the wound healed with a sound scar, and still the woman died of the generalized disease. In judging of curetted masses, we must always consider the physiologic persistence of chorioepithelial cell-masses for some months after labor, to which fact Menge and Kruckenberg have already called attention.

Carl Ruge (207) found the uterine mucosa 8 weeks after a hydatid mole so full of syncytial elements, that he considered the possibility of a malignant growth. A new curettage 8 weeks later did not show anything abnormal. Menge (79) described a similar case. Blumreich's (241) case from the Berlin Frauenklinik (curettage after abortion) showed microscopically no difference from a chorioepithelioma malignum. O. v. Franqué (154) performed vaginal extirpation of the uterus, after the curettage had twice shown syncytial masses, and he was astonished to find a normal uterus. In another case of the same author, in which chorioepithelial masses were removed manually, a currettage performed 20 days afterwards showed a normal mucosa. In Ahlfeld's case after hydatid mole, described by Risel (158), the curettement demonstrated abundant syncytial masses and villi. The muscles

were invaded by ectodermal cells, and still the patient became well after the curettage. In the Littauer-Zweifel case, also described by Risel the curettement showed numerous ectodermal wander-cells between the muscle fibres; inside of venous vessels could be seen heaps of these ectodermal cells and syncytial masses too, but only a few cells of the character of Langhans' cells. Marchand advised against an operation and the patient became perfectly well. Risel's second case of beginning malignant chorioepithelioma (158) deserves this name no more than Blumreich's case. It is merely a destructive placentary polyp. To these cases probably a number of other ones might be added. We are not able to classify the tumor from those cellular proliferations arising from villi, deported or retained within the uterus. Usually we find both cell-layers in proliferation. The character and the tendency of the chorioepithelial growth can only be defined by the histologic appearance of the cell-masses growing independently from the villi in the adjacent muscles or by metastases. From this point of view Veit's (126) case and also Kruckenburg's (162) have to be regarded as atypical.

The definition of the age of the growth proves another difficulty in the valuation of the outcome as the menses are many times irregular. Still it is of greatest importance. Kruckenberg's picture of chorioepithelial formations gives the impression of highest malignancy, but as the masses were removed only shortly after the expulsion of the hydatid mole and besides were in connection with villi, they cannot be admitted as a factor defining the malignant tendency of the proliferation. Grein's (155) case of atypical chorioepithelioma shows an excessive invasion and destruction of the uterine muscles by wander-cells. Many of these cells present a distinct plasmodial character, their cytoplasm and nucleus staining like plasmodium, which is characteristic of maximum cell-life. Otherwise the histologic character is the same as in Fleishmann's (182) case. When judged by the character of the wander-cells, Grein's case ought to be regarded as more malignant than Fleishmann's case. However, since the uterus was removed soon after the mole was expelled, the wander-cells have retained their plasmodial character.

CLINICAL POINTS, ALLOWING DISCRIMINATION BETWEEN MALIGNANT GENERALIZED AND HARMLESS LOCALIZED CHORIOEPITHELIAL PROLIFERATIONS

The histologic marks are therefore very insignificant. Much more importance must be given to the history and the clinical symptoms of the case. A cessation of the menses has to be regarded as a new pregnancy in all those cases, in which the last pregnancy dates back several years. Wherever pregnancy can be excluded with certainty, when the menses were never suspended or irregular, the possibility of a teratoid genesis has to be considered. Particularly in those cases in which the genitalia proved to be free and very large tumors were found in other organs, as for example in the suprarenal glands, as in a case reported by Rosthorn (232). Here the diagnosis of chorioepithelioma malignum should not be made unless the presence of all other structures can be excluded. Drewitzki's (212) case of chorioepithelioma, with general metastases, originating in the urinary bladder of a maid 75 years old, and also Halliday-Croom's (25) case, complicated by a cystic tumor, arouse the suspicion of a teratoid genesis. All cases of chorioepithelioma malignum after labor at term have to be looked upon as unfavorable and especially those in which the uterus proved to be free from the growth. All 6 reported cases ended fatally. Langhans' (172) case, as stated above, is merely a villous infarct without a villus and was probably preceded by a new pregnancy. More harmless are proliferations following a hydatid mole.

The most significant point in the clinical diagnosis is the discrimination between a localized process and a generalized chorioepithelioma. The localized growth, developed within the placental region (placentary polyp, destructive mole), is relatively harmless. It remains local, because the maternal organism masters any dissemination. On the other hand, even the most ingenious operation is without favorable prospect in a case of generalized chorioepithelioma. Case 1 of Buerger (91), also Wallart (100). Whether the chorioepithelioma is generalized or not we may learn from the general condition of the patient and from the clinical appearance of the case. By this

I do not mean whether the woman is bleeding, or whether she has a purulent discharge. These symptoms point only to the presence of a tumor inside of the uterus, and as emphasized before, those cases, where the uterus was free from growth, and where there was no primary tumor, are the unfavorable ones, and those which defy all our therapeutic efforts. A woman might have a generalized chorioepithelioma and still the curettement may give evidence of a normal mucosa, she might even flow once or twice in regular intervals as in normal menstruation — Risel (34), Case 5, Holzapfel (115). Pulmonary symptoms should not be valued too highly. In a disease which chiefly takes place inside of blood-vessesls, an occasional pulmonary infarct cannot astonish us. Chorioepithelial elements, as far as I know, never have been detected in the sputum. There is only one short reference, Peham's case, by Huebl, referred to in the *Centralblatt für Gynäkologie*, 1903, which, however, has not been verified.

A woman suffering from chorioepithelioma malignum gives always the impression of a very sick person. The waxy pallor of her face is something quite different from that of a woman weakened by abortional or myomatous hemorrhage. The physical examination does not explain the accelerated filiform pulse, the reduction of the hemoglobin, and the general weakness. A well and fresh-looking patient with chorioepithelioma, who dies suddenly, succumbs to embolism or rapid sepsis, as in L. Fraenkel's (42) case.

The whole doctrine of the chorioepithelioma malignum has been greatly influenced by the spontaneous recovery from it. The latter is closely connected with the biologic conception of this peculiar growth. We heal carcinoma by the extirpation of the diseased organ. Theoretically the possibility of curing a beginning carcinomatous growth of the uterus even by curettage must be admitted, as reported by v. Franqué and Gesner. But, as stated in the introductory lines of this paper, the histologic diagnosis of a beginning malignant growth is something very doubtful and talking too much about such uncertain things leads only to a dangerous misconception by the laity.

Even early diagnosed and surgically treated malignant growths recur quite frequently and especially in young individuals. On the other hand vaginal extirpation of the uterus, in chorioepithelioma, seems to give better results than in carcinoma. In order to explain the sometimes incomprehensible recurrences the conception of a multicentric disposition for carcinoma was introduced by Thiersch. Although we have to recur to this hypothesis, explaining recurrences as late as 8 or 10 years after extirpation of the carcinomatous organ, in most cases the recurrence is the result of a spreading of the growth much farther than at first assumed. My previous statement, that there is often no primary tumor to be found in those cases of malignant chorioepithelioma which have ended fatally in a short time, seems to be confirmed by Schmorl's latest findings. Schmorl (229) proved that embolism of placentary cells occurs at all periods of pregnancy; furthermore that it is independent of labor proper and can be found especially in vesicular mole. These deported placentary cells may even proliferate. In molar pregnancy progressive changes will be found constantly in placentary cells deported to the lungs, but even in partial mole Schmorl was able to demonstrate an invasion of the wall of blood-vessels in the lungs by these cells.

SPONTANEOUS RECOVERY FROM INCOMPLETELY OPERATED CASES OF CHORIOEPITHELIOMA

The question of the time of the origin of these growths cannot yet be answered with certainty. A new light is thrown upon this question by a case published by Laura Branson (9). She observed a presumably typical chorioepithelial growth during labor, eighth month. Introducing the forceps part of the growth became separated from the external os. The woman died a few days after labor. Mostly during the last months of pregnancy the patient complained of intense headache and her pupils were enlarged. There is nothing said about the eye-grounds. The histologic details too are painfully short and do not permit definite conclusions, and no autopsy was made. Otherwise this would be the first observation of a malignant chorioepithelioma, which gave sypmtoms of generalization during pregnancy, which became manifest during labor at term.

The development of this growth during pregnancy, together with Schmorl's findings of a physiologic placentary embolism, could make one believe that the age of the deported fetal elements is the factor which defines the malignancy of the chorioepithelial proliferation. This would be the simplest solution of this complicated question. The unfavorable prognosis of all cases after labor at term would in this way be easily explained. The malignant chorioepithelioma, which, according to Virchow's definition of growths, is not a true neoplasm, would merely represent a cellular infection, similar to the general carcinomatosis — Davis and Harris (28) case of chorioepithelioma. In perfect harmony with this would be also the striking morphologic likeness of the relatively harmless atypical chorioepithelioma with the accumulation of chorionic wandercells to be found within the uterine muscles in the destructive placentary polyp and mole. However, even then we will not understand the temporary malignancy, the regional character, and the spontaneous recovery, unless we assume maternal protective powers.

The conception of spontaneous recovery from malignant chorioepithelioma has been forced upon us by those cases in which the removal of the diseased organ entirely within the field of healthy tissue was impossible, as illustrated by the following cases:

MARCHAND-EVERKE'S (106) case was one of labor at term with extirpation of the uterus and recovery. The growth had perforated the uterus and invaded the peritoneum; it contained syncytial cells only and no plasmodium. This case resembles more the destructive, placentary polyp.

KOLOMENKIN (108), the growth, developed after abortion, perforated the uterus and became adherent to the intestines. The few protoplasmic masses, which the author called syncytium, resemble, according to the illustration, syncytial cells more than the real syncytium. The large cells showed mitoses. This should be designated a transition form or better an atypical chorioepithelioma. Recovery followed hysterectomy.

FLEISCHMANN'S (182) case was one of molar pregnancy, with a tumor in the uterus and a vaginal metastasis. During curettage the uterus was perforated. Though extirpation was not permitted, complete recovery was followed by a normal pregnancy. There was no plasmodium, only syncytial cells. An atypical chorioepithelioma.

HOERMANN (184) had a similar case. Hysterectomy was not performed on account of the bad condition of the patient, who became well with subsequent normal pregnancy. An atypical tumor case. The vaginal metastases, infarcts, showed syncytium and Langhans' cells and recurred after extirpation.

NOBLE (123, Case 2): After abortion, the growth involved the bladder. Recovery succeeded supravaginal amputation. There were no Langhans' cells and no plasmodium, only large syncytial cells. An atypical chorioepithelioma.

BUERGER'S (91). Case 2 showed after abortion a vaginal nodular tumor in the region of the bladder. An operation was not attempted, as the growth could not be removed completely and yet the case ended in recovery. Details of the histologic picture have not yet been announced.

DUNGER (130), reported an instance (Case 1) after abortion. Four weeks later hysterectomy was done. There were 2 foci in the uterus and an ulceration at the posterior lip of the external os, but no villi. Nine weeks later there was a recurrence in the form of a vaginal nodule. Extirpation was not permitted, and recovery followed. This, as far as can be judged, was a case of typical chorioepithelioma.

In most of these cases the growth might have been a localized one, although it was of highly destructive character. In others, as in the cases of Fleischmann and Hoermann and also Dunger, in each of which a metastasis was present and recurred, a generalization is not impossible. With exception of Dunger's and Buerger's cases, they were all atypical. I have personally urged the idea of spontaneous recovery. But I take the occasion here to state expressly, that *it has not yet without doubt been proved, whether a generalized, typical chorioepithelioma may heal or not.*

Loenneberg's and Mannheim's (143) case after hydatid mole, with 20 vaginal metastases, and with a primary tumor in the uterus, could be interpreted as a generalized chorioepithelioma. The patient recovered after removal of the uterus by laparotomy and subsequent total extirpation of the vagina. Histologically the case might be numbered among the transition or syncytial forms. The picture given of the vaginal metastasis shows all 3 cell-forms, syncytium, Langhans' cells and syncytial cells, but it differs from that of a malignant metastasis. We miss the blending of the Langhans' cells with the syncytium, as is characteristic for the typical chorioepithelioma. The syncytium in this case is arranged in large heaps and near dissolution into syncytial cells. This case is further conspicuous, like Fleischmann's and

Hoermann's by its protracted course. Hemorrhage and bloody watery discharge continued for two years. Still there is no reason to assume a new pregnancy, as was done with good cause by another author in Hoermann's second case.

The process of healing in a chorioepithelial growth is by nature, and cannot be explained except by the theory that the normal protective powers of the female organism are cytolytic for fetal cells (Schmauch, Fleishmann, Hammerschlag, Kruckenberg, Grein and others). When this theory is applied to chorioepithelioma the significance and extent of spontaneous recovery is modified, and the indication for operative interference is altered too. Polano (222), reviewing the reports of chorioepithelioma, comes to the conclusion, that 50 per cent of all cases which recovered after operation would have done so spontaneously. In my opinion all would have got well, except those in which exsanguination or general infection from the uterine growth were complications. Contrary to the still very speculative spontaneous recovery in carcinoma, one may frankly state, that it is the woman's nature and not the surgeon's knife which cures chorioepithelioma. A general infection with chorionic cells seems to be physiologic; a general proliferation is possible only, when there is a lack of protective forces. In such a case the removal of the uterus proves no cure from the growth. This is demonstrated also by a case recently reported by Lissauer (58). A woman, who was treated for some time for disease of the heart, died suddenly. The autopsy revealed the development of a typical chorioepithelioma in the arteries of one lung; no other neoplastic focus was to be found. Two years before the Barrett uterus had been extirpated on account a chorioepithelioma there (no details about its structure).

INDICATIONS FOR OPERATIVE INTERFERENCE

When chorioepithelioma is cured by the natural protective powers, loss of blood and narcosis will be the least appropriate measures to mobilize the languishing protective powers. Hitchmann (94) is perfectly right when he says he could not resist the impression that in his case the operation only hastened the dissemination of metastases. Persistent hemorrhage, however, as in Velitz' (167) case, or putrefaction, as in Voigt's (153) case, might furnish indications for hysterectomy. But they are the only indications, in my opinion, for a removal of a uterus with chorioepithelioma. Hysterectomy in a case of destructive mole is more justified than the removal of a vaginal metastasis, unless, as in chorioepithelioma of the uterus continuous hemorrhage forces us to interfere. In a vaginal metastasis of a true malignant chorioepithelioma even repeated excisions and cauterizations are of no avail, as proved in my case and those of others — Wehle (7), Peters (32), Huebl (5). Again, when the vaginal metastasis has been transformed into a blood coagulum, it either will disappear spontaneously, as in Hoermann's, Dunger's, and other cases, or it might easily and with apparent success be extirpated; but as Linford's (6) case demonstrates, the chorioepithelial growth is not influenced by this measure. His patient died a few months afterward of general metastases.

This does not mean that there are no metastases when a primary tumor is to be found in the uterus. The same factor which renders possible the proliferation of villous epithelium inside of the uterus, also facilitates proliferations in other organs. Experience shows that whenever a larger primary tumor is found in the uterus, and especially when villi are present, the prognosis becomes better. The metastases developing in vital organs destroy life, consequently in a generalized case a larger tumor will be found in the uterus only occasionally. The great number of cases with localized chorioepithelioma, in which life was ended by sepsis, teach us to strictly prevent infection of this growth.

With our present knowledge, then, of chorioepithelioma malignum, we shall decide comparatively early to remove the uterus in an older woman, when there is an actual destructive growth, but in a young woman only after a serious consideration of all other circumstances.

The chorioepitheliomatous cell is devoid of the absolute malignancy of the carcinoma and sarcoma cell. It has only a temporary one. We do not cure the woman of the growth by

our operative interference, the growing constituents of which have probably permeated the whole parametrium and have settled in other organs. We only relieve her from the weakening hemorrhage and discharge and facilitate hereby the spontaneous recovery. We think it absurd to attempt the removal of an inoperable carcinoma of the uterus, still women with a generalized chorioepithelioma of the uterus and vagina are subjected to the most protracted operations.

SUMMARY

The ideas promulgated in this paper deviate somewhat from those generally accepted. They are based upon the conception that the various chorioepithelial proliferations described in literature as chorioepithelioma malignum, have nothing in common with a malignant growth, as generally interpreted. On the other hand the whole doctrine of chorioepithelioma proves a great support of Ribbert's theory of the development of a carcinoma. Epithelial cell-complexes, torn from their origin and deported, proliferate and form a kind of autonomous growth. *There is only a gradual difference between the simple invasion of the uterine muscles by villi and their sequelæ, such as adherent placenta, the common and destructive placentary polyp, and the common and destructive mole; between the localized chorioepithelial growths, limited to the uterus and placental region, and the villous infarcts, developed by deportation of villi; and finally between those cases in which the lungs were able to retain and master the scattered fetal cells (mostly syncytial and atypical forms), and the typical chorioepithelioma malignum, which becomes generalized through general metastases. Only the latter two types deserve the name of malignant chorioepithelioma.*

In recent publications concerning chorioepitheliomatous proliferations in the male, a tendency is to be noticed to regard those cases of generalized chorioepithelioma, in which the uterus and adnexa proved free from growth, as of teratoid genesis. However, as the connection with pregnancy is an established fact, we have no right to hunt for complicated theories. In many of the cases, in which the uterus was free from growth a closer examination probably would have revealed, as in my case, smaller neoplastic foci in the parametrium. All the enumerated conditions are sequelæ of pregnancy. We deal with proliferations that trespass the physiologic limits necessary for the development of the fertilized ovum and therefore become pathologic. Fetal cells and villi, which normally invade the uterine mucosa to bring about fixation of the ovum and further development, pervade the musculature of the uterus, become deported into vaginal veins, and finally lead to the death of the bearer by general dissemination. Between the physiologic embolism of placentary cells and the typical malignant chorioepithelioma there is only a gradual difference. Schmorl states expressly that small metastatic foci from a malignant chorioepithelioma cannot be differentiated microscopically from chorioepithelial embolism found in vesicular mole.

Whether a badly-nourished inferior mucosa facilitates the invasion of the villi, and leads to adherent placenta and placentary polyp or not, is mere speculation. Whenever villi have invaded intramuscular blood-vessels (not intravillous spaces), a deportation of villi or larger placentary cell-complexes is rendered easy. When retrograde deportation in the external genitalia takes place, it will become manifest to the naked eye, and when deported into the lungs bloody expectoration will result. It is very probable that a number of the small-sized hematomata of the vulva and vagina, the so-called "thrombus vaginæ," are caused by villous infarcts. Older German text-books of obstetrics, as for instance that of Spiegelberg, speak of such hematomata appearing during pregnancy, and some days after labor. While the development during labor was easily understood, in the other forms a friability of the blood-vessesls was supposed to be the cause. It sounds strange to read reports of such patients, and hear of the protracted convalescences and of the grave alteration of the general conditions.

The so-called vaginal metastases, appearing after an operation, from which the patient recovers completely, seem at first sight absolutely malignant. They become easily understood, however, when one assumes that they were already deposited at the time of operation,

but did not become manifest until the insult, connected with the operative interference, lead to the formation of a hematoma.

The presence of villi in a villous infarct is not absolutely necessary for that diagnosis. They might become absorbed, or at other times it is possible that they will not be found. Among 11 cases classified by me as villous infarcts, villi were present 8 times.

As mentioned before, there is only a gradual difference between the very malignant typical, the less serious, and more protracted syncytial forms, and finally the atypical chorioepithelioma, which latter form, in regard to its proliferative tendency, seems to be absolutely benign. Its frequent occurrence after destructive mole and placentary polyp, and its very protracted course (Fleischmann, Hoermann) arouse the suspicion that it is only a "consecutive condition," a later stage of a previously syncytial or typical chorioepithelioma. In Poten-Vasmer's case (178) the first vaginal nodule removed showed syncytium and Langhans' cells, while the second one which recurred contained large, syncytial cells only.

When chorioepithelioma is regarded as a *cellular injection* and not as a true neoplasm, it will be useless to search for histologic marks, proving malignancy or benignity. As the typical as well as the syncytial form may present all the different stages, we will never be able to render a definite opinion upon the eventual malignancy of the process from an extirpated vaginal nodule or uterus. The prognosis should always be a guarded one. Similar as in bacterial infection, the seriousness of the invasion will be judged by the general, clinical symptoms and not so much by the appearance of the diseased part of the body.

Besides my own case, I was able to study the specimens of the 3 cases of Gebhard, the case of Fleischmann, Bacon, Grein, Lockhardt, Pick, Findley, and others. I take this occasion to thank these gentlemen for the opportunity.

The above given division of chorioepitheliomatous proliferations, in localized and generalized growths, is chiefly based upon the clinical symptoms. The histologic significance of a localized process, destructive placentary mole and polyp, depends upon the presence of invaded and deported villi. And, as the destructive mole might be associated with a harmless vaginal infarct, so the latter might be combined with a generalized chorioepithelioma. The practical value of this division is hereby somewhat diminished. Still, it gives a better understanding of this whole mysterious process.

It has to be regretted that gynecologists, in their reports of chorioepithelioma, are mostly engaged in the histologic details and the chronic deduction of the origin of the "syncytium," whereas the clinical symptoms are not considered sufficiently. Everything is expected from histopathology. Marchand's classical histological descriptions form the fundament of all newer researches, while older reports of Saenger, Fraenkel, Bacon, Menge and Veit, which clinically and biologically are of far greater importance, do not receive due notice. The decidual cells and their differentiation from the trophoblast is still discussed. The author, however, who speaks of a deciduoma, is regarded as antiquated — Marchand's (242) criticism of Winkel. The typical chorioepithelioma has become a common thing, while the atypical one is a "*rara avis*" and is observed only by chance, in women who have refused operation. It will still take some time before the conception is universal, that a growth which is called malignant, does not follow the general course and that clinical observation alone will furnish the means to differentiate between benign and malignant chorioepithelioma.

In order to verify this theory, I have tried to arrange the reported cases of chorioepithelioma clinically and histologically. The histologic classification naturally cannot be exact, as the reports are not always clear and as not all the papers contain illustrations which might guide us. A control examination of this literature and a correction of this advocated division only can be of benefit. I have read the reported cases, as far as possible. Some, that could not be classified on account of the shortness of the reports, have been omitted. Even if this incomplete review does not render absolute information, it discloses at least a number of facts that force us to change our opinion of the nature of chorioepithelioma.

As the results become evident from the tabulation of the cases, only a few facts will be mentioned here:

1. *The malignancy of the generalized ch. and the prevalence of the typical ch. among this class.* From 45 not operated and 21 operated cases that died of general metastases, 33 and 13 could be classified respectively. Among these 46 cases, 29 and 11 or 40, typical ch., and 2 and 2 or 4 times syncytial ch. was present. The two other remaining typical cases were connected with destructive mole.

2. *The lesser malignancy of the transition form-syncytial ch. (predominance of large syncytial cells besides Langhans' cells and syncytium).* The larger number of these cases shows only metastases in the lungs and not a generalization. From 25 not operated and 8 operated cases, altogether 33 cases with metastases in the lungs, only 22 could be used for classification. Among this group the number of syncytial cases was respectively 7 and 3 or 10, the typical was 5 and 2 or 7. Three times villi were found, and 2 were atypical cases.

3. *The harmlessness of the atypical ch.* Among the 206 tabulated cases, I find 19 which I regard as atypical ch. consisting of large cells only, without admixture of Langhans' cells and syncytium. Fourteen of them recovered after operation and 5 died. In 2 of these 5, sepsis is given as cause of death, in one nephritis, and in another one death soon followed the operation, while in the fifth the cause of death is not stated. *There is so far not one case of generalization in an atypical ch. reported.*

4. *The comparative benignity of all those cases in which villi were found in the extirpated uterus or in the vaginal infarcts.* Among the 70 operated and recovered cases villi were found 28 times either in the uterus or the curettement preceding the operation. Among 11 cases of villous infarcts, recovered without major operations villi were mentioned 8 times by the author. Altogether I have recorded 20 cases of death, in which villi were found. But only 2 of them were generalized ch., one succumbed to sepsis and the other one to anemia; 3 showed deposits in the lungs only; 2 of these 3 died of sepsis, the third one of anemia. In the remaining 15 cases the chorioepithelial proliferations were limited to the uterus. There were no metastases, they were merely destructive moles or destructive placentary polyps but not malignant ch. In 12 of these cases the cause of death could be established. Six died of sepsis and 6 of exsanguination, internal or external hemorrhage as stated expressly by the authors.

5. While 43 cases of ch. that proved to be malignant were preceded by abortion, only 24 followed molar pregnancy. Again, while 39 operated and recovered cases were preceded by mole, we find only 11 cases that recovered after labor at term. On the other hand, we find 30 cases recorded that died of malignant ch. following full-term labor. Herewith is proved the frequency of chorioepithelial proliferation after mole and the danger of sepsis and exsanguination in destructive mole and placentary polyp, but not the histologic malignancy of such relatively frequent proliferations.

6 The great importance of an exact anamnesis in judging the histologic dignity of proliferations of the cells forming the cell-cover of villi.

BIBLIOGRAPHY[1]

I. Generalized Chorioepithelioma

GENERAL METASTASES, PATIENTS DIED WITHOUT OPERATION (MINOR OPERATIONS AS CURETTAGE NOT INCLUDED).

A. After Labor at Term.

1. E. Fraenkel,* Case 2. Volkmann's klin. Vort., No. 180.

Death occurred 2½ months after labor; general metastases; numerous vaginal nodules; *typical chorioepithelioma;* the Langhans' cells predominate at some places.

2. J. W. Williams.* Johns Hopkins Hosp. Rep., vol. 4.

Vaginal nodule 8 days after labor; death 6 months later; general metastases; *typical chorioepithelioma.*

3. Aczel.* Monatschr. f. Geburtsh., vol. 3.

Died 9 months after labor from purulent peritonitis, caused by perforation of the uterus; metastases; lungs, vagina, intestines, villus-like formations; no villi; prevalence of large cells; typical or rather *syncytial form.*

4. G. Schmauch.* Ztschr. f. Geburtsh., vol. 49.

Vaginal metastasis 3 weeks after normal labor; death occurred 10 weeks after labor; uterus free from growth; *typical generalized ch.*

5. Huebl.* Centralbl. f. Gynäk., 1903.

Seven months' pregnancy; vaginal nodule appeared 7 weeks after labor; 5 months after labor death oc-

[1] Literature consulted only to the end of year 1905. References marked * have been used for drawing conclusions.

curred; general metastases; uterus free from growth; *typical, generalized ch.*

6. LINDFORS AND VESTBERG.* Centralbl. f. Gynäk., 1901; Upsala Läkaref. Förh., vol. 4.

Vaginal nodule 3 weeks after labor; death occurred 9 months after labor; general metastases; uterus free from growth; *typical ch.*

7. WEHLE, Case 1. Centralbl. f. Gynäk., 1901.

Vaginal nodule appeared 6 months after labor; death short time afterwards; no autopsy, but probably generalized, typical ch.

8. WEHLE, Case 2. Centralbl. f. Gynäk., 1901.

Vaginal nodule 6 weeks after normal labor; death short time afterwards; no autopsy; conclusion the same as Case 7.

9. LAURA BRANSON. J. Am. M. Ass., 1905.

Death occurred a few weeks after labor at term with brain symptoms, which were present before labor; parts of the growth removed applying forceps; no autopsy.

10. SCHMORL, FIEDLER.* Inaugural Dissert., Kiel, 1900.

Patient died 8 months after normal labor; uterus contained decidua; *typical, generalized ch.*

11. SCHMORL,* Case 2. Centralbl. f. Gynäk., 1897.

Eighteen weeks after labor at term; vaginal metastasis; patient died within half a year after labor, uterus free; general metastases; *typical generalized ch.*

12. TIBALDI, quoted from Eiermann (243).

Died 4 months after labor at term; general metastases.

13. NETZEL. Hygiea, 1872, quoted from Eiermann (243).

Died 6 months after labor at term; general metastases; pregnancy was preceded by mole.

14. GOETZE, B.* Inaugural Diss., Halle, 1895.

Laparotomy was tried 13 months after labor, but case given up as inoperable; patient died 10 days later; general metastases; *typical ch.*

15. SIEFERT.* Arch. f. Psychol., 1904.

Death occurred 4 months after labor at term; general metastases; *typical ch.*

16. JOHANNA SCHMIDT,* Case 1. Inaugural Diss., Strassburg, 1902.

Patient died 10 months after labor at term; general metastases; *typical, generalized ch.*

17. NORDENTOFT.* Hospit. Tid. Kjobenh., 1901.

Premature birth; mens 7; vaginal metastasis; died 9 months later from continuous vaginal hemorrhage; no autopsy, but, as metastases were present in the gums, generalized ch.; both cells present; *typical ch.*

18. KAUFMANN. Cor. Bl. f. Schwez. Aerzte, 1900.

Patient died 2 years after full-term labor; general metastases; syncytial or typical ch.

19. LOCKYER.* The Practitioner, 1904.

Died 11 weeks after full-term labor (adherent placenta); general metastases; both cells present; no autopsy; *typical generalized ch.*

20. SCHLAGENHAUFER,* Case 2. Wien. Klin. Wchnschr., 1899.

Patient died 34 days after labor at term; metastases in lungs, spleen, and kidneys; *typical generalized ch.*

B. After Abortion.

21. KREWER,* Case 1. Ztschr. f. Geburtsh., vol. 48.

Nine weeks after abortion; *typical generalized ch.*; ovaries normal.

22. MARCHAND,* Risel, Case 1.

Six to eight months after abortion, death occurred; *typical, generalized ch.*

23. BUSSE,* Case 1. Virch. Arch., vol. 154.

Died 5½ months after abortion; *typical, generalized ch.*

24. CHIARI, Case 3. Wien. med. Jahrb., 1877.

Died 6 months after abortion; ovaries, vagina, lungs, and lymphatic glands contained metastases.

25. H. CROOM. Med. Press & Circ., 1902.

Three months amenorrhea; general metastases.

26. E. FRAENKEL,* Case 1. Volkmann's klin. Vort., No. 180.

Died 8 months after abortion; regular menstruation; no external hemorrhage; *typical generalized ch.*

27. RESINELLI. Gazz. hebd. de méd., 1896.

Three months after abortion; metastases appeared in vagina; short time afterwards death occurred; general metastases; *typical ch.*

28. SIMMONDS.* Monastchr. f. Geburtsh., 1903.

Patient died 2 months after abortion; general metastases; no histologic details; but probably *typical, generalized ch.*

29. DAVIS AND HARRIS.* Am. J. Obst., 1901.

Died 2 months after abortion; ovum removed by curettage; general dissemination of the growth as in general carcinosis; *typical ch.*

30. LOCKHARD, GILLIER. Montreal M. J., 1905.

Mole 4½ years ago; irregular menses, died from general chachexia; vaginal metastases; villi present(?), Langhans' cells and syncytium, but also large syncytial cells; no autopsy; doubtful whether generalized.

31 GEBHARD,* Case 3. Ztschr. f. Geburtsh., vol. 37.

Died three to four months after abortion; a vaginal metastasis was previously removed; here as well as in some metastases the Langhans' cells prevailed; ovaries normal; *typical, generalized ch.*

32. PETERS.* Centralb. f. Gynäk., 1902.

Three months after abortion appearance of a vaginal nodule; 4 months later death occurred with brain symptoms; no autopsy, but very probably *typical generalized ch.*

33. SAENGER.* Arch. f. Gynäk., vol. 44. Deutsch. Gesellsch. f. Gynäk., 1891 and 1897.

Died 7 months after abortion from chronic sepsis; an incision was made in the iliac region. General metastases, but altogether more in the pelvis localized growth Prevalence of large epitheloid cells, but S. also speaks of an alveolar arrangement; no villi. *Transition form, syncytial* or atypical (?) *ch.*

C. After Molar Pregnancy.

34. RISEL,* Case 5.

Patient died 8 months after mole; general metastases; *typical, generalized ch.*

35. MARCHAND.* Ztschr. f. Geburtsh., vol. 39.

Died 7 months after birth of mole; uterus contained decidua; *typical generalized ch.*

36. LANGHANS,* Case 1. Hegar's Beitr., vol. 5.
Died 8½ months after molar pregnancy. In the vaginal nodule the Langhans' cells prevailed; no autopsy, but probably *typical, generalized ch.*

37. KREWER,* Case 2. Ztschr. f. Geburtsh., vol. 48.
Five months after molar pregnancy, general metastases; *typical ch.*

38. INGLIS AND BRUCE.* Lancet, 1901.
Died 6 months after molar pregnancy from hemorrhage of the brain. Villi present in the uterus; metastases in lungs and brain. As the authors state, typical ch.(?); *Destructive mole* (?).

39. APFELSTAEDT AND ASCHOF,* Case 2. Arch., f. Gynäk., vol. 50.
Eight days after birth of the mole, tumor in labio minore containing 20 *hydatid villi*, varying in size up to a cherry. Death occurred 4 months later from hemorrhage and sepsis. Metastases in lungs and spleen. No picture of the metastases; ovaries normal; *Destructive mole* (?).

40. KREBS,* Case 3. Centralbl. f. Gynäk., 1903.
Patient died 13 months after molar pregnancy; general metastases, Langhans' cells prevailing; *typical ch.*

41. STANKIEWICZ. Centralbl. f. Gynäk., 1898.
Molar pregnancy with vaginal metastasis; died 5 months later with lung symptoms; operation refused. Probably general metastases; no autopsy.

42. L. FRAENKEL. Arch. f. Gynäk., vol. 48.
July, birth of mole. September, hospital, on account of hemorrhage. March, laparotomy, incomplete operation; fixation of uterus to the abdomen and partial removal of tumor. Patient died in June. Partial autopsy, metastasis in spleen; *typical ch.* and probably generalized.

43. P. MUELLER. Verhandl. d. deutsch. Gesellsch. f. Gynäk., Fourth Congress.
Patient died 4 months after mole; no autopsy and no details. Metastases in the skin; probably generalized, typical ch.

44. DUNGER,* Case 2 (Schmorl). Ziegler's Beitr., vol. 37.
Findings at autopsy of a patient who died with symptoms of hemorrhage from the brain. General metastases; genitalia free from growth; no clinical observation; 3 years previous molar pregnancy (new pregnancy?); *typical ch.*

45. WILSON.* Brit. M. J., 1904.
Died 11½ months after expulsion of hydatid mole; general metastases; good pictures and good histologic description; *typical, generalized ch.*

II. CHORIOEPITHELIOMA MALIGNUM, METASTASES, EXCEPT IN THE GENITALIA, ONLY IN THE LUNGS.

PATIENTS DIED WITHOUT OPERATION

A. After Labor at Term.

46. KOETTNITZ.* Deutsch. med. Wchnschr., 1893.
Patient died 6 weeks after labor from anemia. Vaginal metastases, recurring; inside of the uterus placental remnants; very small metastatic foci in the lungs; *destructive placentary polyp?*

47. CHIARI, Case 1. l. c.
Died 6 months after labor at term; pleurisy and pneumonia; metastases in lungs and broad ligaments.

48. CHIARI, Case 2. l. c.
Died 7 months after labor of peritonitis, 8 days after removal of placentary polyp.

49. H. B. SPENCER.* Lond. Obst. Trans., vol. 38.
Removal of placentary polyp 28 days after labor; died 10½ weeks after labor of sepsis. "Secondary growths in the lungs and the cervix, but nowhere else in the body," large cell sarcoma with typical syncytium; *syncytial ch.;* destructive placentary polyp(?).

50. JULIA COCK.* British M. J., 1896.
Died 3 months after full-term labor from hemorrhage; metastases in lungs and ovaries; *typical ch.*

B. After Abortion.

51. KELLY TEACHER.* J. of Obst. Brit. Emp., 1903.
Two months after abortion, vaginal metastasis; 2 months later death; metastases in lungs and broad ligament, as the author states both cells present, *typical ch.*

52. KWOROSTANSKY,* Case 1. Arch. f. Gynäk., vol. 62.
Died from *sepsis*, 3 months after abortion; metastases in lungs; villi in utero; *destructive placentary polyp.*

53. PFEIFER,* (Chiari 4). Prag. med. Wchnschr., 1890.
Died 4 months after abortion, metastases in vagina and lungs; probably *typical ch.*

54. BUSSE, Case 2. Virch. Arch., vol. 154.
Died 14 days after abortion. Metastases in the parametria, vagina, and lungs. Probably *typical ch.*

55. ZABORSKY. Centralbl. f. Gynäk., 1904.
Died 3 months after abortion from *sepsis*. Metastases in vagina and lungs; cystic tumor behind the vagina; no histologic details.

56. MALCOLM HEBB.* Lond. Obst. Trans., vol. 38.
Died 3 months after abortion from purulent *peritonitis*, caused by spontaneous perforation of the uterus. Metastases only in the lungs. As far as can be judged by the pictures, *syncytial ch.*; nothing mentioned about villi.

57. ANDERS,* Case 1. Munch. med. Wchnschr., 1899.
Died 8 months after abortion; operation tried, but given up. Autopsy revealed *endocarditis*, and numerous metastatic foci in the lungs; no villi; both cells present, *typical ch.*

58. LISSAUER. Ztschr. f. Krebsforsch., vol. 3, 1896.
Operated by Landau for ch.; 2 years later death with symptoms of heart disease. Autopsy revealed one chorioepitheliomatous focus in the lungs but nowhere else; ovaries atrophic.

59. MCCANN,* Case 3. J. Obst. Brit. Emp., 1903.
Died from nephritis; difficult to define histologically. No protoplasma masses; metastases in lungs and vagina, probably *typical* form of *ch.*

60. H. WILLIAMSON.* J. Obst. Brit. Emp., 1903.
Died from *septic infection* 16½ months after abortion, metastases in vagina and lungs, probably *syncytial* form of *ch.*

61. BLAKER.* Trans. of Lond. Obst. Soc., 1904.
February abortion; July opening of abscess; August

27, death. Took a febrile course; growth had sloughed through the uterine wall, ulcer in vagina; secondary deposits in lungs 8 mm. diameter; liver 4 mm.; growth consists of irregular polyhedral cells; no syncytium; no statement about villi; ovaries normal; *atypical ch.*

62. BURDZINSKY,* Case 3. Centralbl. f. Gynäk., 1904.

Hemorrhages for 2 years after abortion; curettage. Death occurred 12 days afterwards (cause ?); metastases in the lungs, vagina, and cervix; B. calls it *typical ch.*

63. WINKLER,* Case 1. Ztschr. f. Geburtsh., vol. 46.

Findings at autopsy; patient died 6 months after abortion; *diagnosis:* Deciduoma malignum fundi uteri gangr., perforat. in flexuram sigmoid.

64. CONDON. Med. Rec., 1905.

Metastases in lungs and vagina; *syncytial ch.* Died 2 years after miscarriage, mens 5; adherent placenta (Indian woman); metastases in lungs and vagina; no histologic details.

C. After Molar Pregnancy.

65. BUTZ.* Arch. f. Gynäk., vol. 64.

Patient died 1 year after mole of cachexia. In the lungs metastatic foci, also tuberculosis; no villi; no tumefaction in utero; regular menstruation. Nowhere in the maternal organism could be detected a proliferation of the syncytial elements; *syncytial ch.*

66. KLIEN.* Arch. f. Gynäk., vol. 47.

Patient died 8 months after mole, febrile course. Metastases in vagina and lungs. Predominance of large epithelial elements, larger and smaller cells; very little syncytium; typical or *syncytial ch.*

67. GUTTENPLAN. Veit's Handb. f. Gynäk.

Three months after molar pregnancy, death; metastases in lungs and vagina; no details; composed mostly of spindle-cells, probably syncytial ch.

68. SOLWIJ AND KRZYSZKOWSKI.* Monatschr. f. Geburtsh., vol. 12.

Died 10 days after removal of the mole of *sepsis, villi in the lungs; destructive mole.*

69. BACON.* Am. J. Obst., vol. 31.

Removal of retained placentary(?) mass after molar pregnancy; patient died 4 weeks later of slow sepsis; *syncytial* form.

70. J. HOFMEIER. Zeitschr. f. Geburtsh., vol. 11.

July mole; December abortion(?); died 6 months after birth of mole. Carcinoma of the placental site; metastases in the lungs.

71. KREBS,* Case 1. Monatschr. f. Geburtsh., vol. 11.

March birth of mole; June curettage; November hospital; a few days later death with fever. Autopsy revealed that the growth was limited to the uterus, parametria and vagina; a very few metastases in the lungs. No Langhans' cells; *syncytial form of ch.*

72. WINKLER,* Case 2.

Findings at autopsy. Patient died 1 year after molar pregnancy. Metastases in vagina, broad ligament and lungs; *syncytial ch.*

III. CHORIOEPITHELIOMA MALIGNUM, METASTASES, EXCEPT UTERUS AND VAGINA, ONLY IN THE LUNGS

DEATH AFTER OPERATION, HYSTERECTOMY

A. After Labor at Term.

73. J. NEUMANN, Case 3. Wien. klin. Woch., 1898.

Five months after labor hysterectomy; 2½ months later death occurred, fever and hemoptysis; purulent meningitis; metastases only in the lungs and at the ending of one ureter. Both cells present; no picture.

74. HELLIER.* Lond. Obst. Trans., 1897.

Patient died 5 months after labor at term. Growth chiefly limited to the uterus and pelvic organs; numerous deposits in the lungs, but also a metastasis in ovary and omentum. According to the picture *syncytial* form.

B. After Abortion.

75. PEHAM,* PERSKE (L. Fraenkel). Monatschr. f. Geburtsh., vol. 11.

Seven months after abortion hysterectomy. Patient died soon afterwards with pulmonary symptoms; both cells in lungs and uterus; no villi; *typical ch.*

76. HAMMERSCHLAG,* Case 3. Ztschr. f. Geburtsh., vol. 52.

Three months after abortion hysterectomy. Patient died from *infection;* a few metastases in the lungs; predominance of large cells; *syncytial form* of ch.

77. KLEINHANS, Case 3. Centralbl. f. Gynäk., 1902.

Operated for tubal pregnancy; salpingo-oophorectomy; died. Autopsy revealed metastases in the lungs and wall of tube; uterus free; ovarian pregnancy(?); structure like that of typical ch.

C. After Molar Pregnancy.

78. LOEHLEIN.* Centralbl. f. Gynäk., 1893.

Died 3 years after molar pregnancy (new pregnancy?), and 10 months after hysterectomy. Death occurred with pulmonary symptoms; no autopsy. The examined specimens did not reveal any plasmodium, no villi; the author had the impression of a round-cell sarcoma; *syncytial* or atypical *ch.*

79. MENGE. Case 1. Ztschr. f. Geburtsh., vol. 30. (Menge's case 2, recovery after hysterectomy, is justly withdrawn by the author, as it showed only molar remnants.)

Seven months after molar pregnancy, hysterectomy, 3½ months later vaginal metastasis. Patient died 13 months after removal of the mole. Metastases in the lungs. As the author states, the epithelioid cells prevailed; protracted course; transition form, *syncytial ch.*

80. BURDZINSKY,* Case 2. Centralbl. f. Gynäk., 1904. (Case 4 is omitted on account of insufficient details.)

Four weeks after mole, hysterectomy; 6 months later death occurred; metastases in lungs, vagina, and region of clitoris. The author calls it *typical ch.*

IV. GENERALIZED CHORIOEPITHELIOMA, GENERAL METASTASES

PATIENT DIED AFTER OPERATION

A. After Labor at Term.

81. REEB,* Case 1. Archiv. f. Gynäk., vol. 71.

Vaginal metastasis, recurring after operation. Pa-

tient died 89 days after labor at term, 34 days after operation. Metastases in lungs; bladder, and omentum; *typical ch.*

82. BUTTERFORD MORRISON. Lond. Obst. Trans., vol. 38.

Two months after labor, hysterectomy; 7 months later death occurred. Large lung tumor; no autopsy, but probably general metastases.

83. STEIDL. Münch. med. Wochnschr., 1903.

Short time after labor, hemorrhage, hysterectomy. Died 30 days after operation; metastases: Vagina stump, lungs, and mesentery; no histologic details.

84. WINDSOR FAIRBAIM. Brit. M. J., 1904.

Hysterectomy 8½ months after full term labor, death 6 weeks later. Partial autopsy showed metastases in liver, etc.; probably general metastases. Not able to decide after description, whether typical or syncytial.

B. After Abortion.

85. BUIST.* Lancet, 1901. (Case 1 of the same author ommitted.)

Three months after abortion, laparotomy; 2½ months later death; no autopsy, but probably general metastases. Langhans' cells prevail; *typical ch.*

86. GOTTSCHALK.* Arch. f. Gyn., vols. 46, 51.

Hysterectomy 6½ months after abortion; died 7 months later; general metastases; as the large cells prevail, probably *syncytial ch.*

87. PROCHOWNICK, ROSENFELD. Arch. f. Gynäk., 1899.

Five months after abortion, hysterectomy, 7½ months later death occurred; no autopsy, but probably generalized ch.

88. TEACHER EDGAR.* J. of Obst. Brit. Emp., 1903.

Ten months after abortion, hysterectomy; 7½ months later death occurred; no autopsy, but evidently *typical generalized ch.*

89. APFELSTEDT, ASCHOF,* Case 1. Arch. f. Gynäk., vol. 50.

Died 26 days after operation and 8½ months after abortion; general metastases; *typical ch.*

90. NOBLE.* Am. J. Obst., vol. 46.

As the author claims after labor at term and 2 years previously, but probably 8 months after abortion; hysterectomy; 6 months later death; general metastases; as pictures show, *typical ch.*

91. BUERGER,* Case 1. Centrabl. f. Gynäk., 1905.

One year after abortion, hysterectomy and extirpation of vagina (several vaginal nodules); 5 weeks later death; general metastases; *typical ch.*

92. AUSTERLITZ.* Monatschr. f. Geburtsh., vol. 15. Ergaenzgsbd.

Nine months after abortion, hysterectomy, placentary polyp without villi; 5 months later dead. As the author states, the syncytial cell-masses become bounded, develop single cells; *syncytial* or typical ch.

93. V. FRANQUÉ,* Case 2. Ztschr. f. Geburtsh, vol. 34.

Four months after abortion, hysterectomy; 6 months later dead; no autopsy. Described by the author as atypical; pictures show *typical ch.*

94. HITSCHMANN. Centrabl. f. Gynäk., 1901.

Menstruation stopped once; hemorrhage for 5 months; vaginal extirpation of the genitalia; 3 weeks later death; general metastases; predominance of Langhans' cells; *typical ch.*

95. MUNROE KERR. Brit. J. Obst., 1903.

Ten months after abortion, hysterectomy; patient died on the same day; no postmortem.

96. TRAUTENROTH, Case 2. Berl. klin. Wchnschr., 1897.

One year after abortion, hysterectomy. Patient died the same day; general metastases.

97. HINZ.* Ztschr. f. Geburtsh., vol. 52.

Ovarian pregnancy, February, first laparotomy; April, second laparotomy; 2 months later dead; general metastases; *typical ch.*

C. After Molar Pregnancy.

98. SCHERER.* Arch. f. Gynäk., vol. 56.

Four months after birth of mole, hysterectomy; 5 days later dead; autopsy showed general metastases; both cells present; *typical ch.*

99 HOERMANN,* Case 1. Hegar's Beitr., vol. 8.

Two and one half years after birth of mole, intraperitoneal hemorrhage; supravaginal amputation; 3½ months later dead; general metastases; *typical ch.*; probably new pregnancy.

100. WALLART.* Ztschr. f. Geburtsh., vol. 56.

Two months after birth of mole, hysterectomy; 2 months later dead; general metastases; rapid course; ovaries normal; *typical ch.*

101. RISEL, Case 4. L. c.

December 1900, manual removal of mole; 4 months later vaginal hysterectomy; 7 weeks later death, with brain symptoms and fever; no autopsy. Prevalence of large syncytial cells; the author therefore calls it atypical, but inasmuch as in some places typical ch. tissue, Langhans' cells, and syncytium are to be seen, it is better ranked among the *syncytial ch.*

V. CHORIOEPITHELIOMATOUS PROLIFERATIONS; LOCALIZED GROWTH

RECOVERY AFTER EXTIRPATION OF THE UTERUS

A. After Labor at Term.

102. V. FRANQUÉ,* Case 1. Ztschr. f. Geburtsh., vol. 34.

Hysterectomy 4½ months after labor at term. Chiefly syncytial masses; v. Franqué points at the transition of syncytium into syncytial cells; muscles only infiltrated by large cells; *syncytial*, perhaps atypical case.

103. GEBHARD,* Case 1. Ztschr. f. Geburtsh., vol. 37.

Seven weeks after labor, hysterectomy; both cells present; large cells and syncytial masses predominate; *syncytial ch.*

104. KUPPENHEIMER.* Centralbl. f. Gynäk., 1895.

Two months after premature labor, mens 8, hysterectomy. Large, decidual-like cells, partly in karyokinesis; sarcoma deciduocellulare; no statement about villi; probably *atypical ch.*

105. KWOROSTANSKY, Case 2. Arch. f. Gynäk., vol. 62.

Hysterectomy 6 weeks after labor; villi doubtful.

106. MARCHAND,* EVERKE. Monatschr. f. Geburtsh., vol 1.

Five months after labor at term, hysterectomy, uterus perforated by probe; uterus could not be removed within sound tissue; part of the growth, adherent to adjacent organs left in the pelvis; vein of the broad ligament contains tumor-cells; prevalence of large syncytial cells; absence of syncytial network, as in a typical case; *syncytial ch.*

107. MENZEL.* Hegar's Beitr., 1902. Festschr. f. Fritzsch.

Perforation of the uterus during curettage, performed for hemorrhage some weeks after labor at term; hysterectomy; *destructive placentary polyp.*

108. KOLOMENKIN.* Monatschr. f. Geburtsh, vol. 12.

Ten months after labor at term, extirpation of the uterus, growth trespassing upon adherent intestines; prolonged course; "the cellular elements surpass the protoplasmatic, syncytial masses; most of the cells are of a large, irregular form." According to the illustration transition form; *syncytial ch.*

109. KLEINHANS,* Case 1. Prag. med. Wchschr. 24.

Hysterectomy 13 months after labor at term. Decomposed placentary polyp removed several times. Venous lumina contained typical syncytium and Langhans' cells. Muscles pervaded by syncytial cells; villi present; *destructive placentary polyp.*

110. BLAUD.* J. Am. M. Ass., 1905.

Hysterectomy 4 months after labor at term; the villous cell cover in proliferation; *placentary polyp.*

111. FREUND, W. H. Ztschr. f. Geburtsh., vol. 34.

Three months after labor, placentary polyp; 7 weeks later appearance of vaginal nodule, recurring 6 weeks after extirpation; 7 months after labor, hysterectomy; no Langhans' cells; *syncytial* or rather atypical ch.

112. ALBERT, Case 2. Centralbl. f. Gynäk., 1902. (Case 1, ch., after tubal pregnancy, removed by laparotomy, recovery; is omitted as doubtful.)

Nine weeks after labor, hysterectomy; as the author states, typical (?) ch.; no statement about villi.

B. After Abortion.

113. BROTHERS.* Am. J. Obst., 1901.

Hysterectomy 4 months after abortion. "A structure, composed of irregularly outlined masses of cells in every way corresponding to decidual elements;" *atypical ch.*

114. CHROBAK. Centralbl. f. Gynäk., 1896.

Nine months after abortion; hysterectomy on account of infection; no histologic details; nothing said about villi.

115. HOLZAPFEL. Centralbl. f. Gynäk., 1901.

Hysterectomy 3 years (?) after abortion; vaginal metastasis. Uterus contained a decidua; not to define histologically.

116. LANGHANS'* Case 4. Hegar's Beitr., vol. 5.

January 1893, abortion; July, curettage (specimen contained hydatid villi), followed by hysterectomy; recovery; remains of abortion or *destructive placentary polyp.*

117. LEWERS.* Lond. Obst. Trans., vol. 39.

Hysterectomy 8 to 10 months after abortion; the picture shows mainly large cells; transition form or *syncytial ch.*

118. JEANNEL.* Annales de gynéc., vol. 42.

Three and one half months after abortion, hysterectomy; the growth contained only decidua-like cells; nothing said about villi; *atypical* case.

119. JOERGENSEN.* Hosp. Tid., 1900.

Curettement, made twice within 2 months after abortion, showed villi; 10 days later, hysterectomy; *destructive placentary polyp.*

120. KARSTROEM, Vestberg. Hygiea, vol. 58.

Hysterectomy 6 months after abortion; nothing said about villi.

121. KLEINHANS, Case 1. Centralbl. f. Gynäk., 1902.

Nodule in vagina and posterior wall of uterus; no details.

122. MARTIN,* KIEFFER. Ztschr. f. Geburtsh, vol. 37.

Fourteen months (?) after abortion, hysterectomy; villi in the uterine veins; *destructive placentary* polyp.

123. NOBLE,* Case 2. Am. J. Obst., vol. 46.

Supravaginal amputation of the uterus, incomplete operation; *atypical* ch.

124. REINICKE.* Arch. f. Gynäk., vol. 53.

Sudden spontaneous perforation, Porro. op. "Sarcoma deciduocellulare;" *atypical* ch.

125. SCHULTZE.* Presbyterian Hosp. Rep., New York, 1901.

Uterus septus; villi present; very good description; atypical case; *destructive placentary polyp.*

126. VEIT.* Veit's Handbuch d. Gynäk.

Four months after abortion, hysterectomy; villi present; *destructive placentary polyp.*

127. HAMMERSCHLAG,* Case 1, (Muenster). Ztschr. f. Geburtsh, vol. 52.

Hysterectomy 10 months after abortion; *atypical ch.*

128. REEB,* Case 2. Arch. f. Gynäk., vol. 71.

Hysterectomy 6 weeks after abortion; no Langhans' cells; remnants after abortion (?); *syncytial* case.

129. MCCANN,* Case 1. J. of Obst. Brit. Emp.

One year after abortion, hysterectomy; very probably localized growth; transition form, *syncytial ch.*

130. DUNGER,* Case 1. Ziegler's Beitr., vol. 37.

Amenorrhea August and September; October 14, hysterectomy; chorioepithelial growth at the portio; 6 weeks after vaginal metastasis; operation refused; no villi; *syncytial ch.*

131. P. FINDLEY.* J. Am. M. Ass., 1904.

Five years and 8 months (?) after normal labor; probably later abortion; vaginal metastasis; ovaries normal. Localized growth; *syncytial ch.*

132. MARTIN, CHRISTOPHER. Brit. M. J., 1904.

Patient was in the climacterium; menses irregular; hysterectomy after 12 weeks of constant hemorrhage; growth consisted of large cells mainly; very little syncytium; no statement about villi; probably *syncytial* case.

133. MCMURTRY. Am. J. Obst., 1902.

May, cessation of menses; June 27, abdominal section; no details.

C. After Molar Pregnancy, Common and Destructive Mole.

134. BUSCHBECK.* Centralbl. f. Gynäk., 1901.

Putrified remnants of mole gave indication for hysterectomy 2 months after birth of mole; villi present; *destructive mole.*

135. CAZIN SEGOND.* La gynécologie, vol. 1.

Hysterectomy 9 months after birth of mole; growth consists mainly of large cells, whose appearance is compared by the author with that of lutein cells; *atypical ch.*

136. E. FRAENKEL, Case 3. Volkmann's klin. Vort., No. 180.

Eight weeks after mole, hysterectomy. The growth contains typical and atypical tissue. The author points to the difference in the histologic structure between this and his two other cases. *Syncytial* ch.

137. Gebhard,* Case 2. Ztschr. f. Geburtsh., vol. 37.

Hysterectomy 4 weeks after birth of mole. Villi present; *destructive* mole.

138. V. GUERARD.* Monatschr. f. Geburtsh., 1899.

Hysterectomy 3½ months after birth of mole; cervix metastasis, containing mainly syncytial masses and cells; no villi; *syncytial* ch.

139. HAULTAIN.* Lancet, 1901.

Hysterectomy 8 weeks after mole; villi present; *destructive mole.*

140. KARSTROEM,* VESTBERG, Case 1. Hygiea, vol. 58.

Seven months after molar pregnancy, hysterectomy; metastasis in vagina; *syncytial* ch.

141. LADINSKY.* Am. J. Obst., 1902.

Hysterectomy a few weeks after birth of mole; simply *molar remnants.*

142. LANGHANS,* Case 2. l. c.

Nodule in cervix, twice recurring after extirpation. Finally, removal of uterus; preponderance of syncytial cells and masses; Langhans' cells also present; transition form or *syncytial* ch.

143. LOENNEBERG,* MANNEHEIM. Centralbl. f. Gynäk., 1896. The other case described by these authors is probably a carcinoma.

Twenty-one vaginal metastases; protracted course, 2 years; divided arrangement of syncytium and epitheliod cells; *syncytial* ch.

144. MARCHAND.* Monatschr. f. Geburtsh., vol. 1.

Hysterectomy 3 weeks after birth of mole; villi present; *atypical* case; *destructive* mole.

145. J. NEUMANN,* SCHAUTA. Monatschr. f. Geburtsh., vol. 3.

Seven weeks after removal of mole, hysterectomy; Both cells present, abundant wander-cells; villi in utero, but not in vagina, metastasis; the latter formed a sharply defined nodule; *destructive mole.*

146. RUNGE.* Arch. f. Gynäk., vol. 51.

Uterus with 5 months old mole removed by supravaginal amputation; *destructive* mole.

147. SCHMIDT, O.* Centralbl. f. Gynäk., 1902.

Hysterectomy 2½ months after mole, villi present; *destructive* mole.

148. ZONDEK.* Arch. f. Gynäk., vol. 70.

Para xvii (?) 70 days after birth of mole, hysterectomy. Chiefly large syncytial cells, but also syncytial masses and Langhans' cells. Numerous wander-cells between necrotic muscle-cells; *syncytial* ch.

149. STICKER.* Allg. med. Centr., Ztg., 1900.

Two years (?) after molar pregnancy, hysterectomy; villi present; *destructive* mole.

150. TANNEN.* Arch. f. Gynäk., vol. 49.

Atypical case; no plasmodium; Sarcoma deciduo cellulare.

151. TEACHER,* PACE. Brit. J. Obst., 1903.

Hysterectomy 1¾ years after mole. Perforation of uterus by probe; *atypical* ch.

152. ULESKA STROGANOWNA.* Centralbl. f. Gynäk., 1897.

Hysterectomy 9 months after mole; villus-like elements, but no true villi; *syncytial* ch.

153. VOIGT.* Monatschr. f. Geburtsh., vol. 9.

Remains of molar pregnancy, operated on account of sepsis; *molar rests.*

154. V. FRANQUÉ,* Case 4. Ztschr. f. Geburtsh., vol. 49.

Hysterectomy 6 weeks after mole; villi present in previous curettement; simply *molar remnants.*

155. GREIN.* Arch. f. Gynäk., vol. 72.

Seven weeks after molar pregnancy, hysterectomy; curettement 5 days before showed villi; atypical ch.; *destructive mole.*

156. HAMMERSCHLAG,* Case 2. Ztschr. f. Geburtsh., vol. 52.

Four months after molar pregnancy hysterectomy; extensive decidua in the uterus; *atypical ch.*

157. KROENING.* Deutsche Klinik, 1904.

Hysterectomy 2 months after mole on account of grave anemia; only large epithelioid cells; no statement about villi; *atypical ch.*

158. RISEL,* Case 2 (Guenther). Arb. a. d. path. Inst. Leipz., 1.

Two months after mole, hysterectomy; villi in utero; *destructive mole.*

159. RISEL,* Case 3. l. c.

Hysterectomy 3 months after mole; no villi; no plasmodium; *atypical ch.*

160. MALCOLM BELL. J. Obst Brit, Emp., 1903.

Hysterectomy 3 weeks after birth of mole; no histologic details.

161. JAFFE.* Arch. f. Gynäk, vol. 70.

Atypical case; isolated nodule in uterus; villi present; *destructive* mole.

162. KRUCKENBERG.* Ztschr. f. Geburtsh., vol. 53.

One month after delivery of mole, hysterectomy; villi and chorioepithelial proliferations inside of uterine veins; muscles infiltrated only by syncytial cells; the author calls it justly atypical ch., but as villi were present, it ought to be named *destructive mole.*

163. LAVAGE. Brit. M. J., 1904.

Hysterectomy 11 weeks after delivery of mole; villi present; *destructive mole.*

164. METCALF,* SAFFORD. Am. J. Obst., 1904.

Molar remnants; picture shows uterus in puerperal condition; wander-cells.

165. BURRAGE.* SURG., GYN. AND OBST., 1905.

Hysterectomy 6 weeks after mole; the picture shows typical chorioepithelial proliferations.

166. LOMER.* Centralbl. f. Gynäk., 1903.

Twelve days after removal of hydatid mole, ovariot-

omy; 3 weeks later, second laparotomy and extirpation of uterus on account of perforation of the uterus and hemorrhage; only large syncytial cells; no plasmodium; no villi; *atypical* case.

167. v. VELITZ.* Ztschr. f. Geburtsh., vols. 52, 53.

Two and one-half months after molar pregnancy, hysterectomy; villi in the uterus; described as atypical case; *destructive mole.*

168. HOLLEMANN,* EIERMANN. Graefe's zwangl. Abhandlg., vol. 37.

Patient had molar pregnancy 3¾ years before, followed by climacterium. Probably new pregnancy 6 weeks before hysterectomy was performed. Structures in some places like that of typical ch., *syncytial ch.*

169. SIPPEL, quoted from Eiermann (243).

Hysterectomy one month after molar pregnancy; no statement about villi, but probably destructive mole.

170. NOVÉ, JOSSERAND, LA CROIX.* Ann. de Gynéc., 1897.

Hysterectomy a few months after mole; large syncytial cells only; *atypical ch.*

171. CROSSEN, FISCH.* Am. Gynec., 1903.

Four months after delivery of mole, hysterectomy; villi present, as illustration shows; prevalence of large syncytial cells; *destructive mole.*

VI. VILLOUS INFARCTS, LOCALIZED GROWTH, RECOVERY WITH AND WITHOUT EXTIRPATION OF THE VAGINAL NODULE.

172. LANGHANS, Case 3. Hegar's Beitr., vol. 5.

Six months after labor at term, appearance of vaginal nodule; not regarded as malignant by Langhans; previous curettage of uterus showed villi; a new pregnancy, abortion is not impossible.

173. L. PICK. Verhandl. d. deutsch. Gesellsch. f. Naturforsch., 1897. Berl. klin. Wchnschr., 1897.

Appearance of vaginal nodule during pregnancy; contained villi. Pick declared them deported nonmalignant villi.

174. SCHLAGENHAUFER, Case 1. Wien. klin. Wchnschr., 1899.

Seven months after abortion, appearance of vaginal nodule; no villi.

175. H. SCHMIDT, Case 1. Centralbl. f. Gynäk., 1900.

Four months, after birth of mole, appearance of 2 vaginal nodules; the larger contained *villi;* scrapings of the uterus negative.

176. H. SCHMIDT, Case 2. l. c.

Seven weeks after abortion, appearance of vaginal nodules, containing *hydatid villi.* In both cases the marginal parts, also the paravaginal tissue proved to be free from fetal cells.

177. ZAGORJANSKI, KISSEL. Arch. f. Gynäk., vol. 67.

Three to four weeks after abortion, appearance of 2 vaginal nodules; the larger contained *villi.*

178. POTEN, VASMER. Arch. f. Gynäk., vol. 61.

Molar pregnancy, mens 4; appearance of vaginal nodule, containing *villi;* extirpation of uterus with mole and vaginal nodule; a few weeks later appearance of a new vaginal nodule, also containing *villi;* extirpation. As the author states expressly the specimen of the latter nodule showed, in the place of Langhans' cells, polymorphous cells, with an irregular, deeply stained nucleus (syncytial cells).

179. BURDZINSKY, Case 1. Centralbl. f. Gynäk., 1904.

Appearance of vaginal nodule during molar pregnancy; three days after excision of the nodule; abortion; no statement about villi.

180. L. PICK, LANDAU,* l. c.

Short time after abortion, appearance of 2 vaginal nodules, containing *villi;* uterus cavity free.

181. MOLTRECHT. Münch. med. Wchnschr., 1902.

Three and a half months after abortion, appearance of 2 vaginal nodules; preponderance of syncytium over Langhans' cells, hysterectomy; no statement about villi, but the author regards it as a localized growth and not as malignant.

182. FLEISCHMANN. Monatschr. f. Geburtsh., vol. 17.

Two and three fourths years after birth of mole, tumor in utero and nodule in vagina; extirpation of the latter, curettage of the uterus, hereby perforation of the uterus; hysterectomy refused; normal labor 2 years after operation. The growth in vagina and uterus contained only large syncytial cells, no syncytium, in the uterus besides decidua cells. Purest specimen of *atypical ch.* As no operation was performed the case is ranked among the villous infarcts.

183. BURDZINSKY, Case 6.

Small tumor in vagina after molar pregnancy, containing *hydatid villi.*

184. HOERMANN, Case 2. Hegar's Beitr. z. Geburtsh., u. Gynäk., vol. 8. Ztschr. f. Geburtsh., vol. 54.

September, abortion; November, curettement; decidual islands; March, hospital, removal of two vaginal nodules by Pacquelin, and curettage; the scrapings showed typical ch., muscles, however, only infiltrated by wander-cells (new pregnancy?). Sections of the nodule present the picture of syncytial ch., absence of true plasmodial masses; soon afterwards appearance of a new vaginal nodule. Operation was refused, still the patient recovered and soon became pregnant again.

VII. CHORIOEPITHELIOMATOUS PROLIFERATIONS, LIMITED TO THE UTERUS; NO METASTASES; LOCALIZED GROWTH.

PATIENTS DIED AFTER OPERATION

185. TRAUTENROTH, Case 1. Berl. klin. Wchnschr., 1897.

Four days after labor at term, hemorrhage; 4 months later, hysterectomy; 14 days later death; paralysis of the heart; no metastases; no statement about villi; nowhere is to be found an invasion of the muscles by tumor-cells; destructive placentary polyp (?).

186. RISEL, GRAEFE.* Centralbl. f. Gynäk., 1902.

Four to five months after abortion, hysterectomy; villi were found shortly before; died of sepsis; no metastases; *destructive placentary polyp.*

187. H. SCHMIDT, Case 3. l. c.

Seven months after labor at term, removal of an intraligamentary chorioepithelial growth, which included the ovary; no villi were found; possibility of ovarian pregnancy cannot be excluded; paitient died 16 hours after operation, of pneumonia.

188. HAMMERSCHLAG,* Case 4. Ztschr. f. Geburtsh., vol. 52.

Four weeks after abortion, isolated nodule in uterus, hysterectomy; patient died of sepsis; no metastases; *atypical ch.*

189. BONNAIRE,* LETULLE. Revue de Gynéc., 1901.

Five weeks after birth of mole, hysterectomy; two days later death, exsanguination; no metastases; *destructive mole.*

190. NEUMANN,* Case 2, Illich. Monatschr. f. Geburtsh., vol. 3.

Supravaginal amputation of uterus with mole on account of hemorrhage; patient died 3 days afterwards from sepsis; no metastases; *destructive mole.*

191. GOTTSCHALL, P.* Hegar's Beitr., vol. 4.

Two months after removal of mole, a sudden anemia set in; laparotomy proved the uterus to be perforated; vesicles of the mole protruding from the perforation; patient died during the operation; no autopsy, but evidently no metastases; *destructive mole.*

192. LINDFORS, A.* Centralbl. f. Gynäk., 1897.

Two and a half months after mole, hysterectomy; died short time afterwards; no metastases; the growth consisted of large cells only; *atypical ch.*

193. BURDZINSKY,* Case 5. l. c.

Five and a half months after abortion, hysterectomy; death 2 days later; cause (?); no histologic details; the author calls it *atypical ch.*

VIII. CHORIOEPITHELIOMATOUS PROLIFERATIONS, LIMITED TO THE UTERUS; NO METASTASES; LOCALIZED GROWTH

DEATH WITHOUT MAJOR OPERATION

194. ZAHN.* Virch. Arch., vol. 96.

Perforation of the uterine wall with formation of hematocele; patient died from septic peritonitis; villi present; the necrosis of the uterus is explained by pressure; *destructive placentary polyp.*

195. H. MEYER.* Arch. f. Gynäk., vol. 33.

May, removal of mole; November, removal of new formed masses; January, death, *pyemia; partial* autopsy; no metastases; mainly syncytial masses, the atrophic muscles infiltrated by wander-cells; *destructive mole;* villi present.

196. VOLKMANN.* Virch. Arch., vol. 41.

Interstitial development of mole; patient died from anemia; no complete autopsy; *destructive mole.*

197. JAROTZKY, WALLDEYER.* Virch. Arch., vol. 44.

Patient was 3 times pregnant; 3 times manual removal of placenta; died from exsanguination after mole; possibility of interstitial pregnancy; *destructive mole.*

198. KRIEGER.* Beitr. z. Geburtsh. u. Gynäk., 1872.

Destructive mole, with perforation of the uterus; uterine hemorrhage continued for 8 months; patient died of peritonitis.

199. v. KAHLDEN.* Centralbl. f. Path. Anat., 1891.

Patient died 3½ months after labor at term. No metastases; villi present; no plasmodium; *destructive placentary polyp.*

200. KALTENBACH* (Rummel). Verhandl. d. internat. med. Congr., Berl., 1900.

One and a half years after mole perforation of the uterus; intraperitoneal hemorrhage; possibility of a new pregnancy cannot be excluded; *destructive mole.*

201. HAMMERSCHLAG, Case 5. Ztschr. f. Geburtsh., vol. 52.

Died 2 years after mole. Currettage was made twice first chorioepithelioma, second endometritis interstitialis; cause of death internal hemorrhage; autopsy limited to the abdomen, revealed intraligamentary development of the growth; the histologic description fits that of a typical ch. as well as early stages of pregnancy; a new pregnancy is probable.

202. KREBS,* Case 2. Centralbl. f. Gynäk., 1903.

Findings at autopsy (patient had a miscarriage several months before); large villous, hemorrhagic tumor of the uterus, involving the peritoneum and adnexa; no metastases; very few neoplastic elements; most of them were large syncytial cells; mitoses; *syncytial ch.*

203. ANDERS,* Case 2. Münch. med. Wchnschr., 1899.

Three months after spontaneous birth of mole, development of large masses in and behind the cervix, containing villi and perforating into the vagina. Death 14 days later from peritonitis; no metastases; bronchopneumonic foci in the lungs; *destructive mole.*

204. PESTALOZZA,* Case 3. Atti d. soc. ital. d. ost. e. gin., 1895.

Four months after mole, death occurred (syncope); tumor in uterus contained villus-like formations, *villi* also in blood-vessels; no metastases; nodules, in the arteries of the lungs, emboli, composed of large syncytial cells; syncytial ch. or *destructive mole.*

205. DUNGER,* Case 3. Ztschr. f. Geburtsh., vol. 37.

Died during the preparations for removal of the mole for hemorrhage. No real metastases but deported fetal cells were to be found in the lungs, in proliferation, invading the tissues; *destructive mole.*

206. WILTON.* Lancet, 1840.

Finding at autopsy. Perforation of the uterus after heavy lifting; hemorrhage into the abdominal cavity; molar pregnancy; no metastases; *destructive mole.*

207. RUGE, CARL. Ztschr. f. Geburtsh., vols. 33, 37 40. Ergebn. d. allg. Path., Jahrg. 1.

208. HEUKELOM, SIEGENBECK. Arch. f. Anat. u. Physiol. anat. Abth., 1898.

209. WEBSTER, CLARENCE. Am. J. Obst., vols. 10 and 50.

210. VAN DER HOEVEN. Arch. f. Gynäk., vol. 62.

211. VEIT AND SCHOLTEN. Ztschr. f. Geburtsh., 1903.

212. DRJEWITZKY. Virch. Arch., vol. 178.

213. PINTO, C. Hegar's Beitr., vol. 9.

214. BAUEREISEN. Ztschr. f. Geburtsh., vol. 53.

215. SEITZ, LUDWIG. Centr. f. Gynäk., 1905.

216. HITSCHMANN. Ztschr. f. Geburtsh., vol. 53.

217. BOSSE, P.* Ztschr. f. Geburtsh., vol. 52.

218. MINOT. Trans. of Am. Gyn. Soc., 1904.

219. WARMANN. Centralbl. f. Gynäk., 1892.

220. LITTAUER. Arch. f. Gynäk., vol. 71.

221. VOIGT. Ztschr. f. Geburtsh., vols., 51, 65.

222. POLANO. Volkmann's klin. Vort., No. 320; Habilit. Schr. Erlangen.

223. Loeb, L. Arch. f. Entwcklungsmechn., vol. 6.
224. Kreutzmann. Am. J. Obst., vol. 37.
225. McFarland. Am. J. Obst., 1904.
226. Peterson. Münch. med. Wchnschr., 1902; Arch. f. klin. Chir., vol. 32.
227. Fischer. Deutsch. med. Wchnschr., 1905.
228. Steinhaus. Centralbl. f. Gynäk., 1896; Pathol. Anat., 1899.
229. Schmorl. Centralbl. f. Gynäk., 1893, 1897, 1903, 1905, p. 130.
230. Fritsch. Centralbl. f. Gynäk., 1892.
231. Krompechner. Ziegler's Beitr., 1904.
232. Rosthorn. Beitr. z. Geburtsh. u. Gynäk., 1903.
233. Heinsius. Ztschr. f. Geburtsh. vol. 54.
234. Kworostansky. Arch. f. Gynäk., vol. 70.
235. Doria. Arch. f. Gynäk., vol. 76.
236. Hitzchmann. Ztschr. f. Geburtsh., vol. 53.
237. Nelis, Ch. L. Obstetr. Annal., 9.
238. Hansemann. Virch. Archiv., vols. 110, 123.
239. Gebhard. Patholog. Anat. d. weibl. Geschl.
240. Askanazy. Centralbl. f. Pathol. Anat., 1902.
241. Blumreich. Ztschr. f. Geburtsh., vol. 40.
242. Marchand. Ztschr. f. Geburtsh., vol. 47.
243. Eiermann. Samml. zwangl. Abhandl. Fr. u. Geburtsh., ii, Bd. 1.

PLEURAL FISTULA

A Review of the Literature; Report of Cases and of Experimental Work on Dogs

By R. M. PARKER, M. D., Chicago

Pleural fistula, (*Lungenhautfistel* of the Germans, the French *fistules cutanées on sous-cutanées* of Bouchut) (3) is defined by Quint (1) as "a direct communication of the lung parenchyma or of a bronchus with the external air through the chest-wall." The pleural cavity takes no part in the pathology of pleural fistula. Hence the term is not applicable to an open pneumothorax which has ruptured externally. Neither does it include fistulae existing between the lung or bronchus and the aorta, esophagus and stomach. Laub (2) describes two varieties of pleural fistula (a) complete and (b) incomplete. In the latter class he includes those cases in which the fistulous tract extends from the lung to a subcutaneous abscess on the chest-wall, requiring only perforation of the skin to convert it into the complete form.

In searching the libraries, I was surprised at the dearth of literature on the subject of pleural fistula. The text-books in common use do not mention the condition. The more complete works, like von Bergman's "Handbuch der Praktischen Chirurgie," refer to it incidentally if at all. In Rickett's (24) excellent work on "Surgery of the Lungs and Heart," all reference to pleural fistula is wanting. In Garrè and Quincke's (4) little work, however, an excellent description of the condition is to be found.

The first cases of pleural fistula were reported in 1856. Günsberg (5) found it complicating an attack of pneumonia-abscess and Couveillier (6) described a case belonging to the incomplete variety of pleural fistula, secondary to an abscess of the lung. A great air tumor appeared under the left clavicle.

Wunderlich (7), in 1861, described a case in which the patient, a man of 27 years, previously healthy, developed a fistula three months after a probable pleuro-pneumonia. An emphysema covering the left thorax was found to communicate with the lung. No air was present in the pleural cavity, but there was a fluid exudate at the bottom. The patient recovered from the emphysema. The fistula closed and a partial resorption of the exudate occurred.

Billroth (8), in 1862, reported a case of peripleuritic abscess which ruptured externally. A whistling, crackling sound was heard, caused by the escape of air through a lung fistula. The patient recovered without the appearance of emphysema. Biermier (9) (1863) observed a case of bronchiectasis associated with a subcutaneous abscess extending from the ninth dorsal to the lumbar vertebra. When the abscess was opened pus and air escaped. Autopsy showed the abscess cavity communicating directly with the bronchiectatic lung, which was adherent to the costal pleura. There was no pneumothorax.

Schuber (10) (1867) relates an interesting account of a patient suffering with pulmonary

tuberculosis associated with an open abscess on the posterior chest-wall. One day while coughing violently, the patient experienced a sudden distention of the cavity and air streamed from its opening. The author believed that the process on the back and that in the lung were unassociated until the lung cavity burst through the tissues, already permeated by pus, to the cavity on the chest-wall, thereby establishing a fistula. No autopsy was made.

In a case observed by Resch (11) (1869) an abscess pneumonia developed in a child which was said to be suffering from pertussis. The abscess pointed at the greatest curvature of the eighth intercostal space. Pus and blood had previously been expectorated several times. The tumor could be reduced by pressure but it reappeared when released. The abscess was opened, when pus escaped and air streamed out with such force that a candle was extinguished. A hard body found in the abscess cavity proved to be a head of barley (Kornähre) or of some other small grain.

In a patient with a tubercular cavity, reported by Böhm (12) (1872), a tumor reached from the clavicle to within three fingers of the nipple. In the lower part of the tumor a swashing sound was to be heard. The upper part was an elastic cushion, over which metallic tympany was audible.

"The causes and significance of lung fistula" was discussed by Böhm (13) in 1871.

Perrin (14) (1879) reported an interesting case of pleural fistula in a soldier, previously strong and robust. He suffered from a whole series of abscesses on the thorax. Scarcely had one healed when another appeared. The abscesses contained pus and air. Emphysema of the chest-wall developed after the patient had begun to cough. Perrin regarded the fistula as secondary to the chronic phlegmonous process in the subcutaneous tissue of the chest.

A case of pleural fistula which followed the spontaneous opening of an immense abscess was reported by Woodbury (15) (1879) from the clinic of Gross. The origin was undoubtedly tubercular.

Phthisis was again responsible for a fistula reported by Chase (16) (1880). A painful swelling appeared in the right mammary gland. The tumor contained air and pus. A fistula followed incision.

Frærtzel (17) (1885) reported a somewhat obscure case of lung fistula in a tailor, aged 29. Its origin was not apparent. Autopsy showed an emphysema of the anterior mediastinal tissues which could be traced down the trachea and bronchus on to the finest bronchioles. Here a closed bronchiole terminated in a series of air vesicles "arranged like a string of pearls." Communication of the empyematous tissue with bronchus or alveolus could not be demonstrated.

Quint (18) (1888) describes a long-standing case of tuberculosis, in which a slight crepitation was felt in the right second intercostal space near the costal-cartilage. Autopsy revealed a lung cavity extending to the chest-wall.

A pleural fistula following a gunshot wound was reported by Gonda (19) in 1891.

In Charlton's (20) case (1892) a tubercular abscess opened on the upper portion of the sternum. The patient heard a peculiar noise in the wound when he coughed, and when he tried to inspire, with nose and mouth closed, air whistled through the minute orifice in the chest-wall.

Barié (21) (1893) had a patient who suffered from a gas abscess at the fifth intercostal space. It was supposed that the tumor connected with a tubercular cavity in the lung.

In 1894 it was Friedrick's (22) fortune to observe three cases of pleural fistula. In one case two fistulæ remained after draining an empyema. One led to the upper right lobe and the other to the lower lobe. In another case, caries of a vertebra was the starting point of a fistulous tract which was very long. One end was in a bronchus while the other opened on the skin in the upper part of the thigh. In the third case multiple fistulæ resulted from a traumatic gangrene of the lung.

Laub (2) (1901) with a review of the literature on pleural fistula, reported at length the history of a tubercular patient with a suppurating cavity in the lung apex. The abscess ruptured into the superficial connective tissue of the neck and emphysema ensued.

While a student in Vienna it was my privilege to be present when Kovacs presented a case which resembled, clinically, the one described

by Fraentzel (17). The patient was a young woman who suddenly developed subcutaneous emphysema over the upper part of the body. Physical examination showed the anterior mediastinum filled with air but pneumothorax was absent. It was assumed that a tubercular focus in the lung border, becoming adherent to the parietal pleura at the mediastinum, ruptured when the air, without entering the pleural cavity, found its way upward behind the sternum to the superficial fascia. The patient recovered.

It is my privilege to report here in detail a case of pleural fistula which was operated on by Prof. W. E. Schroeder, in his clinic at Wesley Hospital before the Junior Class of the Northwestern University Medical School.

CASE. Mrs. O., aged 27, of Swedish birth, married seven years, was mother of three children, youngest 20 months old. During the first confinement, she received a bad perineal tear from which she suffered until it was repaired three years ago. She was then in good health until one year ago, when she had an abortion of unknown cause. Since then she has had, more or less constantly, backache, dizziness, and general weakness. Her present trouble began in July, 1904. While eating peanuts, she laughed heartily with a mouth full and inspired something into her lungs; a particle of husk, she thinks. A violent coughing spell ensued, when the body, she believed, was expelled. Two or three days later, however, the patient was seized with chills and fever, and was obliged to take to her bed, where she remained several days. During this time she apparently ran a light course of pneumonia. From then until October she coughed a great deal, sometimes so violently that she vomited. She fell off in weight about sixty pounds. In October, an abscess was located in the right lower lobe, which was opened and drained by Prof. Schroeder. A large portion of the lobe was gangrenous and the discharge had a vile odor. After the operation the cough was less troublesome and the patient's general condition improved, but she failed to regain her normal weight. The wound refused to heal and the discharge of pus continued until the following March, when she re-entered the hospital.

Present condition: Poorly nourished, face pale, mucous membranes moderately anæmic, skin soft and moist. Eyes, tongue, and throat normal. Right chest flattened before and behind; lags on full inspiration. Scar from former operation, three inches long, located on right thorax one inch below and external to the inferior angle of the scapula. Near the center of the scar is a small clump of granulations, which marks an opening from which pus oozes. When the patient coughs hard, air and pus escape with a bubbling, crackling sound. The interne injected some iodoform emulsion into this opening, which caused the patient a violent fit of coughing, during which she expectorated some of the mixture. On percussion, the lower right lobe was absolutely dull, while respiratory excursion and vocal fremitus were wanting. Repeated examinations of the sputum for tubercle bacilli were negative. The urine was normal. Hemoglobin estimate showed a moderate anæmia, and blood count gave 9,600 leucocytes. The temperature was elevated one degree at times and the pulse ranged from 80 to 100.

The patient was anesthetized with gas and ether, and an incision was made over the lower lobe posteriorly. Several inches of four ribs were resected. A probe was passed through the fistula in the lower lobe and when it touched the mucous membrane of the bronchus a prolonged paroxysm of coughing followed. An abscess cavity, through which the fistula passed, was discovered and thoroughly cleansed by curettement and dissection. The opening in the lung was closed by uniting its opposing margins with a continuous catgut suture. A second suture covered the first with healthy lung tissue. The incision in the chest-wall was closed except at the lower angle, where a large rubber drainage tube was placed.

The discharge, at first very profuse, gradually diminished until the patient left the hospital at the end of three weeks. One month later, there was a profuse creamy discharge from an opening at either end of the wound. The upper one was large enough to admit the index finger. From it escaped bubbles of air with a loud noise whenever the patient coughed, showing that the fistula had recurred. The woman passed from observation when she went to the country for the summer.

In the above abstract of case-histories it will be seen that the fistula is but an incident in a complicated pathological process, and that, in order to appreciate the significance of a fistula, it is necessary to study it in connection with the lesion with which it occurs. Pleural fistula arises, according to Quint (1), in two ways: first, by perforation outward of a diseased process in the lung, usually an abscess; second, by extension inward of a suppurating focus in the chest-wall. Any of the numerous pyogenic microörganisms may be the cause of the suppuration. By far the most frequent offender is the tubercle bacillus associated with secondary infections.

Garrè and Quincke (4) say that a fistula may arise from a direct injury, like a stab or gunshot wound. An open pneumothorax would apparently follow perforation of the chest-wall and lung, but a pleural fistula may result during the healing process of such a wound, as illustrated in the case cited by Gonda (19).

A direct fistula may be established intentionally for the purpose of draining a bronchiectasis or a lung abscess. Quincke (4) advocates

such a fistula, in all cases of foreign body in the bronchus, to furnish drainage and thereby prevent abscess formation.

The diagnosis of pleural fistula is readily made by the physical findings. When in the course of a suppurative destruction in the lung and thorax, the stage of incomplete fistula has been reached, our attention is first called to the event by the appearance of subcutaneous emphysema or the presence of a gas-abscess. The tumor may be situated on any part of the thorax but most commonly between the second and third costal-cartilages. The nature of the swelling is easily recognized by its physical characteristics, viz: fluctation, elasticity, impulse on coughing, tympany over the upper part, succussion sounds, and gurgling. The patient may be conscious of the movements of air in the abscess (16). When the abscess is open its contents, consisting of pus and air, escape. On prolonged coughing, air is expressed with a whistling, hissing, or "wind-breaking" noise. The presence of a communication between the abscess and the lung can sometimes be diagnosed by direct inspection. Frederick (23) introduced a throat mirror through the fistula into an abscess cavity, and could see the openings of several fistulæ leading from the cavity. That these opened into the lung was proved by directing the patient to deeply inhale smoke, when little columns of the smoke could be seen issuing from at least three fistulæ. The injection of fluid into the fistula also constitutes a positive proof of lung fistula, provided the fluid can be detected in the sputum. In Schroeder's case, iodoform could be seen in the sputum and smelled on the breath after an emulsion was injected. The patient complained of the taste of iodoform several days after the injection. Another method of demonstrating the existence of a pleural fistula is described by Garré and Quincke (4). The wet hand is placed closely over the opening at the end of complete expiration. Then the patient is instructed to take a deep breath and again breathe out. If the hand is removed toward the end of expiration a perceptible current of air will escape.

A constant symptom of pleural fistula is the discharge which is characteristic only when mixed with air. The amount of discharge depends on conditions present in the fistula. From a short, direct fistula, lined with mucous membrane, there will be a minimum secretion, but the discharge is profuse from a long tortuous fistula lined with granulations, and from one which communicates with an abscess. A biologic study of the secretion is important, and the discovery of tubercle bacilli, pneumococci, or ray fungi furnishes valuable diagnostic and prognostic information.

Patients with complete pleural fistula usually have weak voices and their cough lacks tone and strength, like that heard after tracheotomy.

In studying the course of pleural fistulæ we find that when they are left to themselves they have no tendency to close. In fact, Garrè and Quincke (4) have shown that the pathological lesions, usually present in pleural fistulæ, are not only active in keeping the fistulæ open but also in enlarging bronchiectatic- or abscess-cavities with which the fistulæ may communicate. The authors explain that at the site of a pleural fistula the lung is immobilized by induration and by becoming adherent to the chest-wall. During the inspiratory effort the lung expands, exerting traction on the walls of the cavity in all directions toward the periphery.

I tried to substantiate these statements in experimental work on dogs but I found the fistulæ invariably closed spontaneously, even when they were infected. The difference, however, between the pathological conditions of fistulæ established experimentally and those following long-standing lesions is self-evident.

The unfavorable course of pleural fistulæ without treatment goes far in justification of the severe surgical measures that are often necessary to close them. The presence of the fistulæ are ever a menace to the afflicted. The general health is usually impaired by the presence of a fistula, and is always threatened by those grave amyloid changes which are prone to follow in the wake of long-standing suppuration. Another burden to the patient is the profuse and often repulsive discharge, necessitating cumbersome dressings. Even a fistula unaccompanied by a suppurating cavity is a handicap to the patient, since he is incapable of the intra-abdominal tension contingent to heavy exertion.

Operative interference in pleural fistula, how-

ever, is only too frequently contra-indicated by an advanced pulmonary tuberculosis and by advanced degeneration of other internal organs.

The simplest means of effecting a cure is the actual cautery, which is applicable only in recent cases, uncomplicated by a cavity or considerable induration. The tip of the cautery knife is inserted in the opening of the fistula and the membraneous lining is destroyed. Repeated applications of the cautery at intervals may be necessary to accomplish the desired result (21). In long standing cases, a bloody operation will be required, and in the more stubborn cases nothing short of a series of radical measures applied successively will effect a cure. A suppurating cavity will demand a rib resection more or less extensive. It may be advisable to mobilize the lung at the same time. This consists in separating the adhesions between the costal and the visceral pleuræ. If the visceral pleura is greatly thickened, the lung may be decortizised (Délorme), that is, the thick, indurated pleura is removed by dissection. Mobilization and decortication necessitate entrance of the pleural cavity, which, however, is not to be feared. Mobilization of the lung is calculated to accomplish the same result as mobilization of the chest-wall by rib-resection, and has the advantage over the latter in leaving less deformity and in restoring to the lung its physiological function, at least in recent cases where the atelectasis has not become irreparable. Garré (4) bespeaks for the future a more frequent application of lung mobilization in preference to extensive rib-resection.

In addition to mobilizing lung or chest-wall, it is often necessary to remove the lining of the abscess, in order to obliterate the cavity abscesses in which several bronchioles terminate and present bright red moist surfaces at their bottoms. These consist, according to Garrè (4) of epithelium and not granulation tissue, and they must always be removed before obliteration will occur. If the abscess walls are indurated by much cicatricial tissue, they too must be removed. When a large bronchus opens into a fistula, the removal of several of the cartilage rings to allow collapse and obliteration is necessary. Having applied all the measures necessary to obliterate the cavity, it is in order to close the opening of the fistula on the lung surface. This is done by suturing. But the sutures easily cut through normal lung tissue, so it is important when decorticating, to leave on each side of the fistula a strip of the thickened pleura a half inch wide, in which the sutures will find firm support. A portion of the periosteum from the ribs and a flap of the latissimus dorsi muscle have been utilized in the plastic closure of fistulæ (25) and (26).

How stubbornly a pleural fistula may resist surgical attack is well illustrated in a case described by Krause (27.) The various measures above described were used, but only after he had resected the larger portion of the lower lobe of the lung did he succeed in permanently closing the fistula.

Herewith I wish to report briefly my efforts to establish experimentally pleural fistulæ in dogs for the purpose of studying the pathologic changes. Aseptic technique was followed as rigidly as possible. The field of operation was shaved and thoroughly scrubbed with soap and water, and then with bichloride of mercury solution one to one thousand. The wounds were dressed with plain sterile gauze, secured by two or three turns of adhesive plaster carried around the body.

In talking with colleagues before beginning my experiments I found a quite general belief that dogs withstand operations on the lungs very poorly. I was accordingly influenced to proceed very conservatively in my early efforts to establish a pleural fistula. My plan was to perform the operation in two steps:— first, to effect adhesion between visceral and parietal pleuræ, and second, to estalish the fistula. In five experiments I tried to accomplish the first steps without opening the pleural cavity. An incision was carried down to the ribs on the left chest just behind the scapula. A long curved needle armed with silkworm-gut was passed between the ribs into the pleural cavity through the lung cortex and out through another intercostal space. The ends of the suture were now drawn together and tied tight enough to hold the lung in close contact with the chest-wall. A second suture was passed in like manner two or three inches from the first. The wound was then closed with silkworm sutures. It was hoped that within a few days the lung would become adherent to the chest, when the

wound could be reopened and a fistula established without opening the pleural cavity. The three dogs so treated died within three days. On autopsy, the left lung in each case was pneumonic and the pleural cavity was filled with a sanguinous purulent fluid. No adhesions between lung and chest-wall were found. In the fourth experiment I tried to secure adhesion between the costal and parietal pluræ by burning down to the pleura between the ribs without opening the cavity. Death followed on the fourth day from suppurative pleurisy. The pleura was discolored at the site of the wound but no adhesions had formed. In the fifth attempt a few drops of strong silver nitrate solution were injected into the lung cortex with a hypodermic needle. The dog died like the others from infection of the lung and pleural cavity. None of the hoped-for adhesions were found. On the contrary, considerable sloughing had taken place.

At this point in my work, I obtained a copy of Rickett's (28) "Surgery of the Heart and Lungs," and learned how he had opened the pleural cavities of dogs and cut, sewed, and excised large portions of the lungs without fatal results. I was encouraged to a bolder procedure, and in the rest of my experiments I resected portions of two ribs and entered the pleural cavity. The lower lobe of the lung was then pulled out and sutured to the muscle fascia. The skin incision was then closed. One dog died within twelve hours. The pleural cavity was filled with blood. Another dog died at the end of three weeks from some intercurrent disease. The lung was firmly adherent to the circumference of the opening in the chest-wall. The next dog, the eighth to be operated on, survived the first step in good condition and was brought to table for second step three weeks later. He died, however, from the anesthetic. The lung was found adherent as desired. The ninth dog survived the first step, and three weeks later I reopened the incision and entered the lung to the depth of one inch with the cautery. One week later, I found pus and bubbles of gas escaping from the wound. I am not sure whether the gas came from a pleural fistula or was produced by a gas-forming infection. Three weeks after the last operation the wound was entirely healed. Autopsy showed firm adhesions between costal and parietal pleuræ at the site of the operation. All communication between the lung and exterior was closed. A microscopic section showed the tract of the cautery filled with cicatricial tissue. The sides were bordered by granulation tissue.

In the tenth experiment, the posterior lobe was drawn well into the wound and sutured. About a third to a half of the lobe which protruded was cut away, leaving the bronchus and many bronchioles open. The skin incision was then completely closed. After ten days, the skin incision was reopened, when a seropurulent fluid escaped from the stump of the lung. Bubbles of gas were seen in the fluid, and when a probe was passed into the lung sustance, a paroxysm of coughing was provoked which expelled air and pus from the wound. This was considered proof of a pleural fistula. The dog went for the next three weeks without a dressing and was then posted. The wound was completely healed. No trace of the fistula was to be found. The lung was adherent at the site of operation. There was little if any air in the pleural cavity. A marked emphysema of the lung was noted which was evidently compensatory for the portion removed.

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POST-OPERATIVE THROMBOPHLEBITIS[1]

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ANY post-operative complication awakens great interest in the surgeon, especially a complication whose etiology is more or less obscure. Numerous monographs have been published on post-operative thrombophlebitis, and many theories advanced as to its cause, but as yet only plausible explanations have been put forward in the attempt to show why this disturbance in an otherwise uneventful convalescence should take place. Many a surgeon has been chagrined by its appearance, and the patient must needs remain longer in bed.

A review of the literature only tends to strengthen the fact, that a tenable theory of the etiology has not been reached.

Coe, in reporting 7 cases, says that the clinical history throws little light on the subject. Very few cases die so that post-mortem findings are of little value. His aseptic technic was the best. There were no foci of infection at the time of operation, and no raw surfaces were left in the pelvis. In 3 cases there resulted a thrombophlebitis of the veins of the left broad ligament, continuous with the crural veins of the same side. The edema was only moderate, showing that either a partial thrombosis or good collateral circulation was present. Femoral thrombophlebitis followed the removal of the appendix vermiformis in 3 cases. According to Welch crural thrombosis often occurs after this operation.

Lennander claims that the complication of thrombophlebitis is due to sepsis. Pressure from bandages and fecal masses in the sigmoid should be excluded.

Mahler reports 22 cases of femoral thrombophlebitis, of which 14 were fatal from pulmonary embolism. He claims that intra-pelvic is more serious than crural thrombosis. In the crural veins the thrombi become organized but in the pelvic veins, which are valveless, the clot may extend to the iliacs and emboli be carried to the lungs. The absence of edema does not necessarily mean that the trouble is less serious. Removal of large neoplasms causes the intra-abdominal pressure to sink and the pelvic veins to dilate. On the other hand these pelvic veins may become contracted by a plastic exudate. The raw surface remaining after the enucleation resembles the placental site, clots plugging the cut ends of the blood-vessels. Old thrombi may be present at the time of operation. Such old thrombi in the veins of the broad ligament in connection with disease of the adnexa, etc., may extend to the pampiniform plexus after operation. Thrombi form in these plexuses and in the utero-vaginal veins on both sides. The capillary circulation of the broad ligament is such that collateral circulation is slowly established.

Vasquez holds that post-operative phlebitis is always due to infection, even in mild cases. He, however, speaks of an aseptic phlebitis following injury to the vein and says that the thrombus may become infected later. Germs may come from the original focus or invade the vein from without through the vasa vasorum. Thrombosis is simply a clotting and is always secondary to a phlebitis. He further states that it is a rare complication and occurs most often after ovariotomy.

[1] From the Clinic of Obstetrics and Gynecology, University of Michigan, Reuben Peterson, M.D., Director.

Wyder states that thrombosis of the crural and the pelvic veins is not uncommon. The thrombi may be absorbed if not infected, hence many cases are unnoticed. Thrombosis is not confined to complicated operations. Pulmonary emboli are due to thrombi in the pelvic veins, rather than in the crural veins. Thrombosis gives rise to no symptoms until it reaches the vena cava inferior. This condition may be present before operation, and Wyder admonishes surgeons to be careful about operating upon patients with venous obstruction. Asepsis is then of little avail.

Albanus in an excellent monograph goes deeply into the subject of thrombophlebitis. He divides the causes into septic and non-septic. His classification of the etiologic factors is so ingenious that it is worthy of a more or less detailed description.

Before the Operation. Changes in the heart-muscle or its valves, changes in the blood itself, or changes in the vessel-walls are strong contributory causes. A long-continued dorsal position before operation, tumors of the abdominal or pelvic organs that produce a pressure upon the pampiniform plexus or an enlarged spleen in septic cases, may pave the way for thrombophlebitis after the operation.

From the Operation. Cooling of the abdominal viscera, injuries to the vessel-walls, adhesions of the peritoneum, and thrombi in the cut ends of the blood-vessels may lead to occlusion of larger veins pelvis and lower extremities.

From the Anesthetic. Both ether and chloroform produce an injurious effect upon the heart-muscle.

After Treatment. The bandage causes increased pressure upon the abdominal organs and hinders the return flow of blood from the lower limbs. The continued dorsal position, meteorismus, and increased abdominal pressure, are also contributory causes.

Anatomical Relations of the Pelvic Vessels. Fecal masses in the sigmoid hinder the return flow by pressing upon the left external iliac vein, which is longer than the right and which is also crossed at right angles by both the right external and left internal iliac arteries.

His explanation of thrombophlebitis, following appendicitis, is worthy of note. Thrombosis, after an operation for removal of the appendix, is due to a more or less general peritonitis, with a high position of the diaphragm. This causes a lessened expansion of the thorax and hence lessened diastolic expansion of the heart, which in turn causes too little blood to be driven into the arteries and veins, or too little nourishment.

Strauch attributes this complication to the use of ether and the Trendelenburg position, and reports 3 cases occurring in his private practice in substantiation of this theory.

Clark emphatically asserts that post-operative thrombophlebitis is not of infectious origin. Further, it is not due to traumatism of the perineal, pelvic, or iliac vessels, but to a propagating thrombus arising in the deep epigastric veins, the thrombus growing downward until the iliacs or femoral veins are reached, when femoral thrombosis with its attending symptoms takes place. A thrombus is first partial or mural, later it may fill the vessel and become occluding. It may also extend beyond the point of origin. The primitive thrombus in the deep epigastric grows in the direction of the blood current until the femoral is reached when the direction is reversed. It may progress only as far as the first tributary but is generally prolonged. Thrombi are first soft and moist but later become hard and granular.

Theories of formation may be grouped under three heads:

1. Alterations in blood in exhaustive diseases.
2. Mechanical disturbance in the circulation; slowing and irregularity are not so much to blame as the formation of eddies, where one blood stream is injected into another, at right angles or against the current.
3. Lesions of vessel-wall.

Formation may come then from trauma, compression phlebitis, phlebosclerosis, varix, inflammation, lesions, sepsis in the vicinity, etc. Traumatism of the epigastric is important, as this complication almost always follows a laparotomy. Its explanation must lie in some fact peculiar to the abdominal incision. It is due to the anatomic relation of the superficial and deep veins of the epigastric which run parallel, or nearly so, to the central abdominal incision. This condition occurs more often on the left side, owing to more difficult return

flow, which in turn is caused by the greater length of the left iliac vein and its passage beneath the right iliac artery. A distended sigmoid will also interfere with the return flow in the left side. All these are contributory but not exciting causes. Rough retraction of the abdominal wall and the epigastric injures the vessel-coats, and thrombi start. These thrombi of the epigastric project into the femoral, a whirlpool is formed and then retrogressive thrombosis of the femoral takes place.

Schenck has the 3 following theories to offer as a possible explanation of thrombosis:

1. Changes in the blood itself (Hunter, 1793).
2. Mechanical interference with the circulation (Virchow, 1846).
3. Alterations in the vessel-walls (Brücke, 1857).

To the above, infection must also be added. Toxins in the blood are important factors as are also the blood platelets. Slowing of the current by pressure from an overfilled sigmoid and from the overlying artery, especially on the left side, must also be taken into account. This complication happens more often after injury to the pelvic veins.

Miller advances the theory that post-operative pleurisy is due to thrombi in the pelvic veins, from which emboli are carried to the lungs. Later extension of the thrombi to the femorals causes femoral phlebitis.

Boise says emboli come from preëxisting thrombi. The 3 things necessary to the formation of a thrombus are fibrinogen and calcium salts, found in normal blood, and nucleo-protein found in pathologic blood. This nucleo-proteid comes from the blood-plates and leucocytes. Trauma, inflammation, pressure, retardation of flow, cause intravascular clotting. After all operations there are thrombi at the points of violence to the veins. Conditions that pave the way for the formation of thrombi are:

1. Exhaustive diseases.
2. Increase in calcium salts.
3. Presence of nucleo-proteid in the blood.
4. Degeneration of the heart-muscle.

McMurrich has examined the iliac veins in about 150 cadavers and finds in about 33⅓ per cent, or in about 48 cases, that the left iliac vein at or near the bifurcation has an adhesion extending from the anterior to the posterior wall. In many cases the lumen is divided into two parts or channels. Later investigation may show that this adhesion is an important causative factor in the etiology of thrombophlebitis.

Incubation. The time of appearance of this undesired complication is varied. Generally its onset is on the tenth or fourteenth day post-operative. Albanus says when its appearance is before the ninth day, the anesthetic is to blame, after the tenth day, it is due to continued decomposition.

Side Affected. The left side is affected in over 90 per cent of the cases. Cordier has collected 232 cases from the literature, and the left vein was attacked in 213 cases.

Operation. This complication follows operations upon the pelvic viscera most often. Cordier's statistics show the following interesting points.

Myomectomies	69
Abdominal and pelvic operations	56
Appendectomies	27
Oöphorectomies	16

Sepsis. This complication occurs as a rule in clean cases. Cordier reports as follows:

Sepsis absent	166
No mention	56
Sepsis present	10

Albanus had 18 out of 53 septic or 34 per cent.

Emboli. Emboli occur in a few cases, causing often fatal lung symptoms. Albanus reports in 53 with emboli, or 43.4 per cent. These are unusually large, as Cordier in his collection reports only 6 cases out of 232.

Death. This complication *per se* rarely causes death. When further complicated with emboli death may follow very suddenly. Albanus reports 10 deaths from emboli. Most authors do not report a single case. Cordier found 3.

Symptoms. The symptoms usually appear from 10 days to 3 weeks after the operation. In many instances the patient is ready to leave her bed or is already up and around. Fever, chilly sensations, or even a chill, may usher in an attack. The tongue may be coated and

there are evidences of other gastro-intestinal disturbances such as loss of appetite, constipation, nausea and vomiting, etc. There is a feeling of weight and stiffness in the affected limb, which soon becomes the seat of a dull throbbing pain. The pain may be localized in the calf of the leg, less often in the thigh or popliteal space. Tenderness can be elicited along the course of the vein, which is usually marked by a red line. The superficial veins may also present the same signs showing an extension of the disease. The inguinal glands may be enlarged and tender. The limb usually swells from below upwards and may attain great size. It pits on pressure unless the skin has become so tense as to make pitting impossible. The left leg is more often attacked than the right, although both may be the seat of the disease. Wherever emboli find lodgment metastasic abscesses also with their attending symptoms occur. The lungs, liver, kidneys, spleen, and even the brain, may be so affected.

Diagnosis. From the symptoms, time of onset, etc., a diagnosis is usually easy. Neuritis of the affected side may make a differential diagnosis difficult but it should give no trouble.

Prognosis. Prognosis must be guarded, as the chance of pulmonary emboli is ever present. Patients must not be allowed to get up too soon, and the remote effects must be carefully explained.

Prophylaxis. Care must be used in retracting the abdominal wall, not to injure the large vessels. Unnecessary and marked Trendelenburg position should be avoided. Operators should be reluctant to perform operations upon patients who are suffering with heart trouble, wasting-diseases, etc.

Treatment. Rest in bed, wrapping of the affected limb in cotton and the application of a firm bandage are at once indicated. Cold applied in the form of ice bags and the limb placed in an elevated position. All forms of massage, etc., are strictly contraindicated.

A rapid review of the literature on post-operative thrombosis only serves to show that the cause of this complication is not yet discovered. Every author has his own theory. That changes in the blood, in the vessel-walls, trauma of the veins and arteries, sepsis or rough retraction of the abdominal walls either singly or together, can cause this undesirable post-operative complication is not tenable. The formation of thrombi post-operative must be placed among the complications whose etiology is unknown.

From October 1, 1901, to September 30, 1906, there were 1756 laparotomies and plastic operations in the gynecologic service of the University Hospital. Among these there occurred 11 cases of post-operative thrombophlebitis. It is these 11 cases that I wish now to clearly but succinctly report.

CASE 1. Mrs. M. E. W., age 53. Gynecological No. 229. Family and personal history negative. Married 31 years; 7 children; 4 abortions. Bowels very constipated.

Diagnosis. Vagina atrophica, carcinoma fundus uteri.

Operation, June 3, 1902. (1) Hysterectomy, salpingo-öophorectomy bilateralis, appendectomy. (2) Cauterization of secondaries in the vaginal wall and in the cervical stump (July 11, 1902). (3) Cauterization of secondaries in the vaginal wall and in the cervical stump (Sept. 19, 1902).

Appearance. (1) June 15 (12 day); along Poupart's ligament. Pain in shoulders and arms, and June 19 pain settled in the right leg and groin. Pain and tenderness gradually left. July 17, 1902, discharged. (2) August 26, 1902. Returned (26 day?). Examination per vaginum. General thickening in the vaginal vault toward the left. Tenderness in the left iliac region, more marked when bowels move. Swelling of the right leg. Bandage applied.

CASE 2. Mrs. B. B., age 48. Gynecological No. 251. Family and personal history negative. Married 24 years; 9 children; no abortions. Bowels constipated.

Diagnosis. Carcinoma cervicis et fundus uteri.

Operation. Panhysterectomy. Removal of pelvic glands. July 15, 1902. Died at 12.40 P.M., July 16, 1902.

Autopsy. Double traumatic thrombosis of the common iliacs.

CASE 3. Mrs. N. R., age 43. Gynecological No. 470. Mother and grandmother had cancer, former of uterus, latter of back and limb. Typhoid at 15. Pneumonia at same time. No rheumatism. Bowels recently constipated. Married 18 years; 5 children; 1 abortion; chills and fever with last child.

Diagnosis. Carcinoma cervicis et uteri.

Operation, March 27, 1903. Vaginal hysterectomy, dilatation and curettage. Clamps left. Removed March 29, 1903. April 26, pain in right breast. Mastitis. Opened May 2nd. May 3 (26 day), pain in left limb. Elevation and bandage. May 14, discharged. Left leg slightly swollen.

CASE 4. Mrs. J. D., age 31. Gynecological No. 819. Family and personal history negative. Married 14 years; 3 children; no abortions; chills and fever with second child. Bowels constipated.

Diagnosis. Endometritis and metritis.

Operation, March 18, 1904. Dilatation and curettage, appendicectomy, ovariotomy dextra. Enlarged veins in both broad ligaments tied off.

Appearance. April 1 (14 day), pain in left leg. Elevation and bandage. April 4, vein plainly felt. April 6, no pain. April 9, allowed to get up. April 15, discharged. No pain in left leg.

CASE 5. Mrs. C. B., age 39. Gynecological No. 912. Family history negative. Pneumonia at 17. Scarlet fever at 14. Married 10 years; 1 child; 2 abortions. Bowels regular.

Diagnosis. Ruptura perinei, myofibroma uteri.

Operation (1), June 3, 1904. Hysterectomy, supra vaginalis, salpingo-oöphorectomy bilateralis, appendicectomy. (2) June 17, 1904. Perineorrhaphy.

Appearance. June 22 (19 day-4 day), pain in the calf of the left leg. Increased in size. Leg bandaged and wrapped. June 24, pain in the left leg severe. Morphia ¼ gr. given. Sharp pain in the right lung. Ice-bag applied. June 25, pain in the lung and in the leg worse. Leg swollen. July 9, discharged.

CASE 6. Mrs. M. H., age 25. Gynecological No. 994. Family and personal history negative. Married 9 years; 3 children; 4 abortions (induced). Bowels irregular.

Diagnosis. Endometritis, retroversio uteri, oöphoritis dextra.

Operation, Sepetember 16, 1904. Dilatation and curettage, ovariectomy dextra, salpingectomy, appendicectomy.

Appearance. September 27 (11 day), tenderness and swelling of the left calf. Tenderness in the left groin. Left calf 2½ cm. longer. The femoral vein hard. Elevation, bandage, and ice-cap. October 2, pain less. Temperature 98.6°. October 3, no tenderness in femoral region. Vein still hard. October 5 (18 day), pain in right leg. Vein hard, leg swollen, elevation, etc. Pain in right chest. October 7, complains of pain in heart region. Auscultation negative. October 14, pain still persists. October 23, wound healed p. p. Uterus freely movable. No tenderness nor edema in legs. Discharged.

CASE 7. Mrs. E. B., age 31. Gynecological No. 1186. Family history negative. Had pneumonia 3 times. Good recovery. Married 11 years; 2 children. Systolic murmur over apex. Bowels constipated.

Diagnosis. Ruptura perinei interna, laceratio cervicis bilateralis, endometritis.

Operation, March 25, 1905. Dilatation and curettage, trachelorrhaphy, perineorrhaphy.

Appearance. April 3, 1905 (9 day), pain in the left groin. Tenderness and edema below the knee. April 4, 1905 (10 day), pain in the right groin. Indurated cord felt. Some edema. Elevation and bandage. April 5, 1905, pain and edema still continues on the right side. April 26, discharged.

CASE 8. Mrs. G. W., age 65. Gynecological No. 1480. Mother died of cancer of the breast. Sister had cancer removed 10 years ago. Fifteen years ago patient broke her ankle bone. Leg swelled up. Heart always been weak. Heart troubled her 4 or 5 years after this. Married 39 years ago; 4 children; many abortions, self induced. Bowels often constipated.

Diagnosis. Ruptura perinei externa et interna, vulva et vagina atrophica, prolapsus et retroversio uteri.

Operation, December 12, 1905. Perineorrhaphy, hysterectomy vaginalis.

Appearance. December 18, 1905, temperature 104.3° following chill. Exploratio per vaginam negative. December 20, attack of pain about heart. Examination; myocarditis chronica. December 22, temperature 104.° P.M. Perineal stitches removed for better drainage. December 25, coughed some blood stained mucus. Bronchitis (râles). December 28, pain on left side. December 30, sat up. January 1, 1906, pain in left leg. Elevation and bandage. January 22, discharged.

CASE 9. Mrs. B. W., age 29. Gynecological No. 1606. Family history negative. Had a swelling in left pelvic region. Always had trouble with hip especially left. Married 7 years; 2 children; no abortions. Bowels regular. Had trouble in left side ever since she can remember. History of a trauma on left side, later an abscess which gathered and broke. Pain in left inguinal region increased at time of periods.

Diagnosis. Ruptura perinei externa et interna, laceratio cervicis bilateralis, turgescence in the left broad ligament.

Operation, April 13, 1906. Dilatation and curettage, appendicectomy, salpingo-oöphorectomy bilateralis.

Appearance. April 24 (11 day), pain in the left inguinal region. May 6, skin over the femoral region blue, large as a plate, hard, indurated with palpable border. May 8, skin over mass in femoral region blistered. This broke. May 19, left against advice. Exploratio per vaginam negative.

CASE 10. Mrs. G. D., age 34. Gynecological No. 1665. Father has heart trouble. Personal history negative. Married 12 years; 3 children; no abortions. Bowels constipated.

Diagnosis. Ruptura perinei externa et interna, laceratio cervicis, retroversio uteri.

Operation, June 8, 1906. Dilatation and curettage, perineorrhaphy, shortening of round ligaments.

Appearance. June 15, 1906, some heaviness in left leg. June 18, wound healed p.p. Clamps removed from the abdominal wall. Stitches (s.w.g.) from perineum. June 12 (13 day), left leg slightly swollen. Circumference at mid thigh, left 40½ cm., right 36 cm. Femoral vein tender below Poupart's ligament. Ice-cap, elevation and bandage. July 2, better, less tenderness.

CASE 11. Mrs. M. B., age 37. Gynecological No. 1756. Two sisters died of consumption. Married 17 years; 7 children; all instruments except first. Bowels irregular. Pain in left side for six weeks. Abdomen swollen. Edema before entrance. First sound at apex is a murmur (status praesens).

Diagnosis. Ruptura perinei interna et externa, laceratio cervicis bilateralis, retroversio uteri, resistance in both broad ligaments.

Operation, Aug. 31, 1906. (1) Dilatation and curettage, trachelorrhaphy, perineorrhaphy, salpingo-oöphor-

ectomy bilateralis, appendicectomy, ventro-suspension. October 2, 1906. (2) Hysterectomy supra-vaginalis, cholecystotomy.

Appearance. October 6, 1906, pain in right side. Auscultation negative. October 7, status idem. Some suspicious signs in the chest. October 24, complains of pain in the left limb. Wrapped and elevated. October 25, pain in right inguinal region. November 28, discharged.

Etiology. The 11 cases reported above do not throw much light upon the etiology of this complication. Trauma was undoubtedly the cause in Case 2. In Case 11 a contributory cause may be found in the edema that was present before the operation. Constipation was present in all cases except Nos. 5 and 9, but after the operation the bowels were regular. Sepsis was present in one case (3) where a mastitis was ushered in. Only 2 cases (7 and 8) gave history of a previous heart trouble, which a careful examination (status praesens) partially confirmed. Rough handling and retraction of the abdominal wall could not have caused the thrombosis in 4 cases (3, 7, 8, and 10) because the abdominal cavity was not opened.

Incubation. The complication appeared from the 4th to the 36th day. In 8 cases it was ushered in on the 9th to the 20th day.

Side Affected. The right side was attacked in only 1 case (1). The left limb in 6 cases (3, 4, 5, 8, 9 and 10) and both limbs in 4 cases (2, 6, 7 and 11) were the seat of the trouble.

Diagnosis. The 11 cases reported occurred in connection with the following diseases for which the patients came to the hospital for relief:

Carcinomata	3
Endometritis and Metritis	3
Ruptura perinei	5
Myofibroma	1
Retroversio uteri	5
Laceratio cervicis	4
Oöphoritis dextra	1

Operation. During the period stated, the following operations were performed in the gynecological service of the University Hospital. The occurrence of thrombophlebitis in connection with these different operations is expressed by the figures in the parentheses.

Abdominal.— Hernia repair of	2	
Transverse incision	55	
Laparotomies	547	(9)
Paracentesis	8	
Suture of separated recti	34	
Sinus	2	
Tumor of	2	
Anus.—Hemorrhoides	9	
Appendix.— Removal of	316	(6)
Bladder.— Cystoscopy	12	
Local treatment	18	
Removal of	1	
Repair of	3	
Transplantation of	2	
Breast.— Incision of	2	
Broad Ligament.— Left veins tied off	18	(1)
Right veins tied off	17	(1)
Shortening of	1	
Removal of cyst of	6	
Hematoma, evacuation of	1	
Cervix.— Amputation of	35	
Fibroid removal	3	
Polyp removal	2	
Repair of	174	(2)
Drainage.— Abdominal	8	
Breast	2	
Gall-bladder	2	(1)
Vaginal	85	(1)
Fallopian Tube.— Left, removal of	263	(3)
Right, removal of	269	(3)
Left plastic	3	
Right plastic	6	
Gall-bladder.— Removal of stones	9	(1)
Glands.— Inguinal removal of	8	
Mesenteric removal of	1	
Pelvic removal of	1	(1)
Vulvo-vaginal removal of	2	
Intestines.— Adhesions separation of	3	
Large resection of	1	
Small resection of	1	
Kidney.—Right, removal of	2	
Right, suspension of	4	
No operation	653	
Ovarian ligament shortening of	16	(1)
Ovary.— Left incision of	14	
Right incision of	17	
Left removal of	246	(3)
Right removal of	148	(3)
Left resection of	18	
Right resection of	22	(1)
Perineum.— Repair of	268	(4)
Peritoneum.— Removal of cyst of	6	
Removal of tumor of	1	
Round Ligaments.— Anterior shortening (Peterson)	55	(1)
Anterior shortening	5	
Anterior shortening (Alexander)	33	
Anterior shortening (Goldspohn)	1	
Vaginal shortening	10	
Sacro-uterine Ligaments.— Incision of	3	
Shortening	2	
Spleen.— Removal of	1	
Ureter.— Anastomosis of	1	
Catheterization of	8	

Removal of	1	
Urethra.— Removal of Caruncle of	5	
Dilatation of	3	
Uterus.— Anterior fixation	4	(1)
Cæsarean section	3	
Anterior suspension	95	
Dilatation and curettage	547	(5)
Inversion, reposition of	2	
Myomectomy	18	
Polyp removal of	5	
Removal supra-vaginal	129	(3)
Removal total	85	(3)
Abdominal	67	(1)
Vaginal	18	(2)
	85	(3)
Vaginal suspension	2	
Vagina.— Anterior wall repair of	46	
Incision of	15	
Celiotomy	34	(1)
Cyst, removal of	2	
Fistulæ (recto-vaginal)	3	
Fistulæ (uretero-vaginal)	1	
Fistulæ (vesico-vaginal)	6	
Posterior Colpotomy	58	
Vulva.— Excision of	5	
Fibroid excision of	1	

Sepsis. Sepsis was present in 1 case (8), where a mastitis developed following a transfusion of normal salt-solution.

Emboli. Lung and heart complications were present in 4 cases (5, 6, 8 and 11). In 2 cases (5 and 6), the signs were only suspicious but in the others (8 and 11) a diagnosis was comparatively easy.

Death. Case 2 was the only fatal one. The autopsy showed thrombosis of both iliac veins due in all probability to trauma. Case 3 died some months after she left the hospital but her death was due to a recurrence of her old trouble (carcinoma).

Therapy. The treatment was simple but the trouble had to run its course. The affected limb was at once wrapped in cotton and a firm bandage applied. The limb was then placed in an elevated position. No massage, rubbing, etc., of any kind was permitted. For pain in the affected limb, cold in shape of ice-bags was applied. The patient was kept in bed some days after the disappearance of all symptoms.

The Remote Results. Schenck comes to the following conclusions in this regard:

1. That all patients have symptoms for a period from 2 to 4 months after leaving the hospital.

2. That, if the symptoms persist longer than 6 months (by which time the collateral circulation is probably as completely established as it ever will be) there is small chance that they will ever disappear.

3. That in about 65 per cent of all cases there is never complete freedom from attacks of pain and swelling.

To find out the remote results in the 11 cases reported, letters were from time to time written to each patient and their replies show many interesting points.

Case 4. Letter, June 23, 1904 (3 months after the operation). Pain and swelling of left limb has disappeared. Patient complains of pain in left side and in bladder. November 28, 1906 (2½ years later). Left leg pains some at the hip and is still some larger than right. Patient states she was lame for some time after she left the hospital but that the lameness soon disappeared.

Case 5. Letter November 19, 1906 (2½ years after the operation). The left leg pains her when she overworks, is somewhat larger than right. She has to favor her left limb a good deal.

Case 6. Letter January 11, 1905 (2½ months after the operation). Limbs are in awful bad shape. Her home physician says she has dropsy. She is bloated from her feet to her waist.

Case 8. Letter December 31, 1906 (1 year after the operation). Patient has still some pain and swelling in the left limb.

Case 9. Letter July 12, 1906 (3 months after the operation). Patient has had an uninterrupted convalescence, can walk about without pain or inconvenience. Letter from doctor December 22, 1906 (8 months after the operation), says that patient has entirely recovered.

Case 10. August 26, 1906 (3 months after the operation). Patient returned for an examination. Left leg slightly swollen. Tenderness and venous discoloration around ankle. Bandage reapplied. Letter November 30, 1906 (6 months after the operation). The left leg still troubles especially after she has been on her feet a good deal.

Case 11. December 13, 1906 (3½ months after the operation). Legs do not trouble her now.

Replies were received from all but 4 cases (1, 2, 3 and 7). Of the 7 replies received 2 had some pain 3 months after the operation, while 3 were entirely free from pain or only noticed a dull heavy feeling in the affected limb after a hard day's work. At the end of 6 months, one patient noticed some slight pain and swelling after the affected limb had been overtaxed. One patient still noticed some pain and swelling after 1 year, while one wrote that she had entirely recovered. Two patients describe a slight pain and some swelling 2½ years after the operation. The replies are far more satisfactory than those usually received. All the patients were able to do their own work and the majority only noticed pain in or increased swelling of the affected limb after its long continued use.

CONCLUSIONS

1. Thrombophlebitis has still an unknown etiology.
2. The complication can follow almost any operation.
3. Emboli of the lungs are often coincident with thrombosis.
4. The period of incubation is from the ninth to the twentieth day.
5. The left side is more often affected.
6. The mortality is practically nil.
7. The symptoms disappear very slowly and in many cases are more or less always present.

Since the above article was written some experimental work was done upon dogs in the experimental laboratory of Parke, Davis & Co., Detroit, Michigan. At this time an attempt was made to produce experimentally thrombophlebitis of the femoral and iliac veins. Various means were employed to bring out a venous stasis with but comparatively little success. Clark says this experiment is extremely difficult in animals, especially dogs, owing to the rich collateral circulation.

It is a pleasing task for me to take this opportunity to thank my former chief, Dr. Reuben Peterson, for his kindness in allowing me to have access to the histories, and for his many valuable suggestions.

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RECONSTRUCTIVE ENDOANEURYSMORRHAPHY

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TO Matas we owe the greatest advance that has been made in many years in the treatment of aneurysm. This advance consists in discarding the use of ligatures and attacking the disease directly, exposing the whole interior of the sac and carefully and precisely obliterating it by means of sutures, while at the same time we avoid all interference with its relations to surrounding structures, and so escape the ever present dangers from disturbances of its nutrition.

While a considerable number of cases have been reported in which an aneurysm has been obliterated by suture, there have been but few in which a successful attempt has been made to retain, at the same time, the patency of the diseased vessel. This is my excuse for presenting the following case:

George Mabary (colored), age 46. Married 9 years. No children. Occupation, drayman. *Past history:* Syphilis 10 years ago.

History of present illness: In February, 1906, the patient noticed a slight swelling on the under side of the knee, accompanied by pain and throbbing. The pain was not severe at first but gradually increased. This symptom was always worse at night. The trouble was in the beginning believed to be rheumatism, and anti-rheumatics were given for a few weeks. Later on the disease was diagnosed as a boil, and ineffectual attempts were made to "draw it to a head." There was no relief. The pain, throbbing, and swelling, increased. The pain was not severe enough to prevent the patient from hard work nearly all summer. It was for only a few weeks previous to the time of operation that the patient was entirely incapacitated for doing any kind of work. Entered St. Joseph's Hospital, November 18, 1906.

Physical examination: Patient was a man of heavy build, weighing about 190 pounds. Heart and Lungs: Heart dulness was normal. Slight accentuation of the second aortic, otherwise the sounds were normal. Pulse was slow, regular, and compressible. The lungs were normal. There was a well-marked arcus senilis. There was a large pulsating tumor occupying the popliteal space of the right leg. Urine. Sp. gr. 10.24. No casts, albumin or sugar. Temperature was normal.

Diagnosis: Popliteal aneurysm (pathologic).

Operation: November 20, 1906. The leg was elevated for 2 or 3 minutes and an Esmarch bandage applied to the upper third of the thigh. The patient was turned on his abdomen. A longitudinal skin incision was made, 8 or 9 inches in length in the median line over the tumor. This incision exposed the upper three fourths of the aneurysmal sac. The lower portion was covered by the soleus muscle. This muscle was divided for sufficient length to freely expose the lower portion of the aneurysm.

Without disturbing the aneurysmal sac from its relations to the surrounding parts, an incision was made throughout its entire length. Through this incision all blood, blood-clots and fibrin were removed, and the interior of the sac cleansed with gauze wrung out of a hot salt-solution. The proximal and distal openings of the Popliteal artery could be seen in the bottom of the aneurysmal sac, about 2 inches apart and on the same level, showing it to be of the fusiform type. The sac was not of the typical spindle-shape, but quite irregular in outline, showing that in the process of dilatation, pouches had formed in the sac-wall, at points of least resistance. These pouches were filled with fibrin and at these points the inner surface of the sac had a granular appearance, while the remainder of the surface was smooth and glistening. There were no distinctly visible, vascular orifices within the sac, except those leading to the parent artery. After a careful review of the interior of the sac-wall, it was decided to attempt complete arterioplasty or reconstruction of the lost or diseased portion of the artery, reconstructive endoaneurysmorrhaphy, one of the variations of Matas' fundamental operation. Accordingly, a soft rubber catheter, No. 14 French, with a silk ligature, previously tied about its center, was introduced, one end in the proximal, one in the distal opening of the Popliteal artery, Fig. 3. The silk tied to the catheter was for the purpose of removing it when the suturing was complete. With a continuous suture of No. 0. iodized catgut, the walls of the sac were closed snugly over the catheter, making a new channel. The suturing was from both ends toward the center, and when the suturing was complete, the catheter was withdrawn, and the 2 ends of the suture united. The Esmarch bandage was loosened and the blood allowed to flow through the newly formed vessel. A slight oozing could be seen at one point, this was reinforced by one additional suture and the Esmarch removed.

Pulsation in the new vessel could be both felt and seen plainly. The remainder of the sac was obliterated by approximating its surfaces, with 2 tiers of buried catgut sutures, Fig. 4. The divided soleus muscle was repaired and the skin incision closed with drainage. With the leg slightly flexed, a well-padded posterior splint was applied and held in place by a starch bandage, and the patient put to bed with the limb elevated. Time of operation: One hour and thirty-five minutes.

Post Operative Notes: The foot on the affected side did not regain its normal temperature while the leg was elevated, but by placing it on a level with the body, the circulation was immediately improved. The

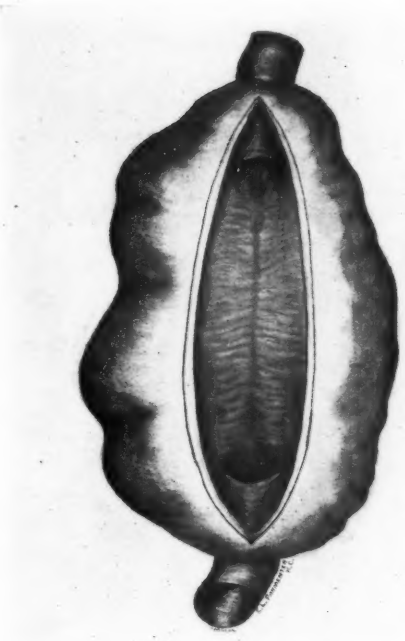

FIG. 1. Type of fusiform aneurismal sac emptied of its blood clots and fibrin. The openings in the bottom of the sac lead to the parent artery.

posterior tibial pulse could not be found *in either leg* after the operation. No attempt was made to find it in either leg previous to the operation. The wound was dressed 24 hours after the operation and drain removed, there was a slight discharge of bloody serum, the wound was dressed again the second, third, and fourth, days, when the discharge ceased. The dressing was not disturbed again for 4 days, and then on account of a slight rise in temperature, at this time, a small collection of serum and blood was evacuated from the upper angle of the wound; no futher rise of temperature. There has never been any swelling of the foot or leg. A peripheral neuritis developed along the great toe and inner side of the foot, about the second or third day after operation, which persisted for 2 or 3 weeks. After this symptom had cleared up the patient resumed his former occupation, that of drayman; his work consisted principally in loading and unloading stoves. I have seen this man often since the operation, in fact, within the last 2 weeks. The result is ideal.

Although the final functional results in this case were completely satisfactory, there are some points connected with the case to be especially considered. First, the morphology of the sac, to which reference has already been made, as to whether or not this was in the beginning a sacciform sac with a single opening and gradually transformed into a sac of the fusiform type, or a fusiform sac from the beginning.

Second, the loss of the posterior tibial pulse in both arteries after the operation. It is not known whether there was a posterior tibial pulse in either artery previous to the operation, therefore, it is not likely that the loss of the pulse in the tibials was the result of the operation, especially in the case of the unaffected limb. Had this unusual occurence appeared only in the affected side, it might be accounted for by secondary thrombosis and embolism from a previous endarteritis. The unusual development of the soft structures about the ankles may have obscured the pulse in the tibials or possibly it was an anomaly.

In the literature at my command, there are only 6 recorded cases of reconstructive endo-

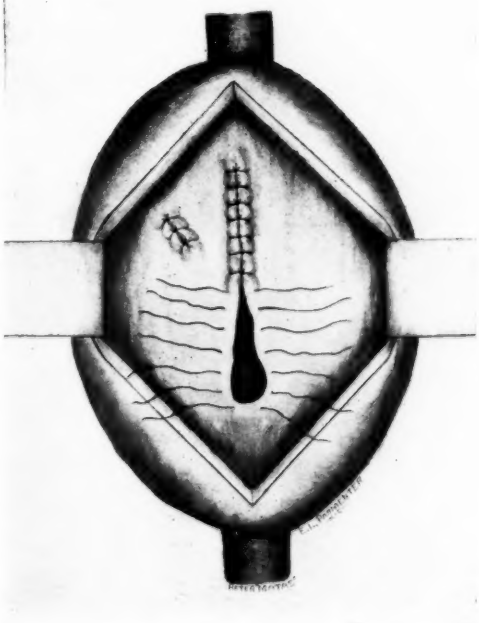

FIG. 2 Shows the method of obliterating vascular orifices within the sac by inter-saccular suture

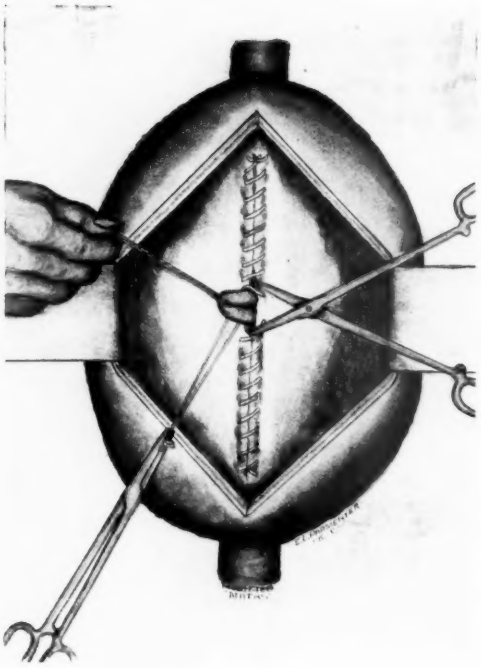

FIG. 3. Reconstruction of the diseased artery by suturing the sac walls over a rubber tube. The force in removing the tube is applied against the hemostat.

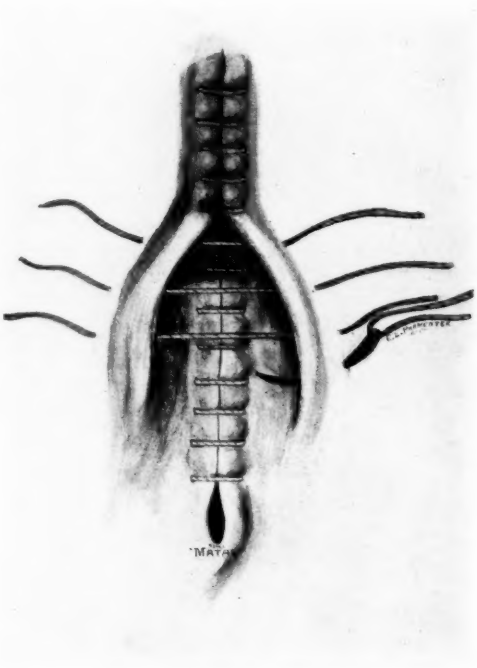

FIG. 4. Obliterating the aneurismal sac after reconstruction of the artery.

aneurysmorrhaphy, but in a recent communication from Dr. Matas he said, "Since the publication of my paper, read in Boston last year, there have been reported a number of successful and instructive cases of the reconstructive operation." According to the statistics already gathered, there can be no further question as to the value of the obliterative and restorative operations.

Reconstructive endoaneurysmorrhaphy is the only one of the procedures described by Matas for the cure of aneurysm about which there can be any controversy, and here the controversy is entirely concerning the class of cases suitable for operation. The choice of operation must depend on a more careful study of the aneurysm than it has been the custom in the past to make.

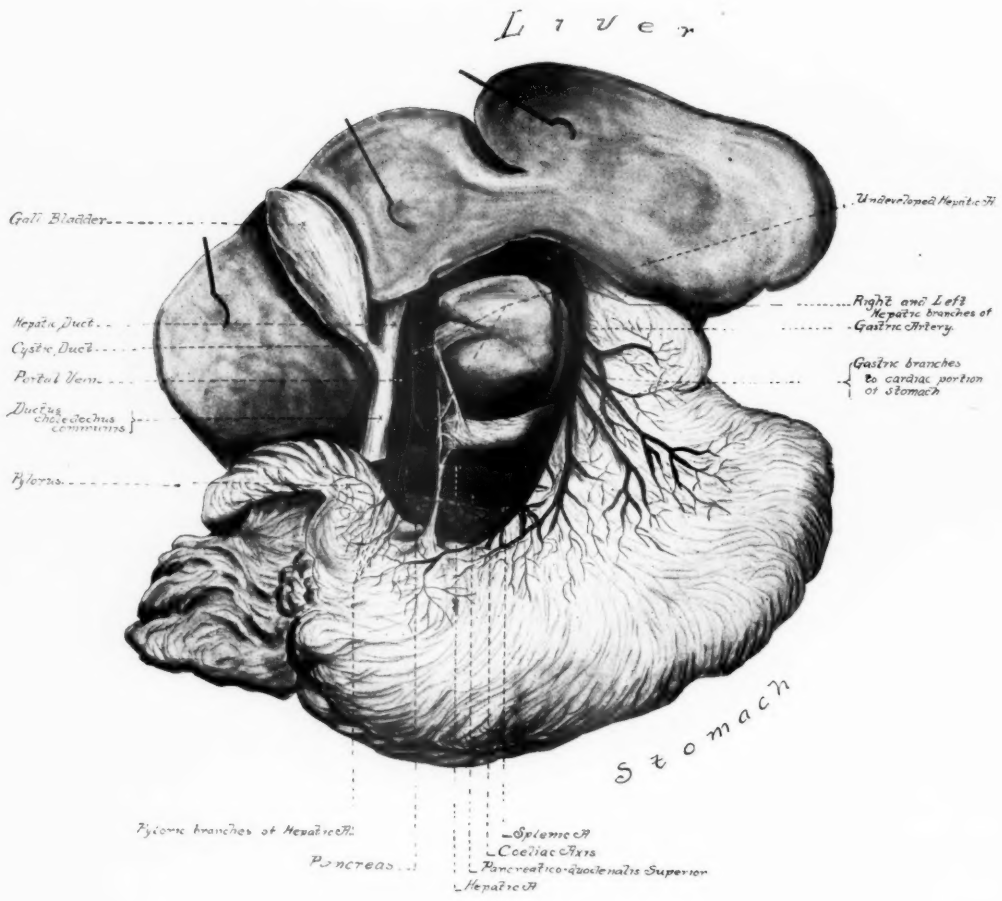

PLATE I.

AN ANOMALY OF THE CŒLIAC AXIS

By C. H. McKENNA, M.D., Chicago, Illinois

DURING dissection the last year, I came across the following interesting anomaly of the cœliac axis. As shown by the accompanying cuts, the division of the cœliac axis into its three main vessels obtains, namely, the gastric, splenic, and hepatic. However, it will be noted that in this case, as shown in the accompanying illustrations, the hepatic artery passes directly into the gastro-duodenalis, giving off only a very small rudimentary branch to the liver. At the same time the gastric artery, normally the smallest of the three, is found to be abnormally large and gives off two large branches, which pass to

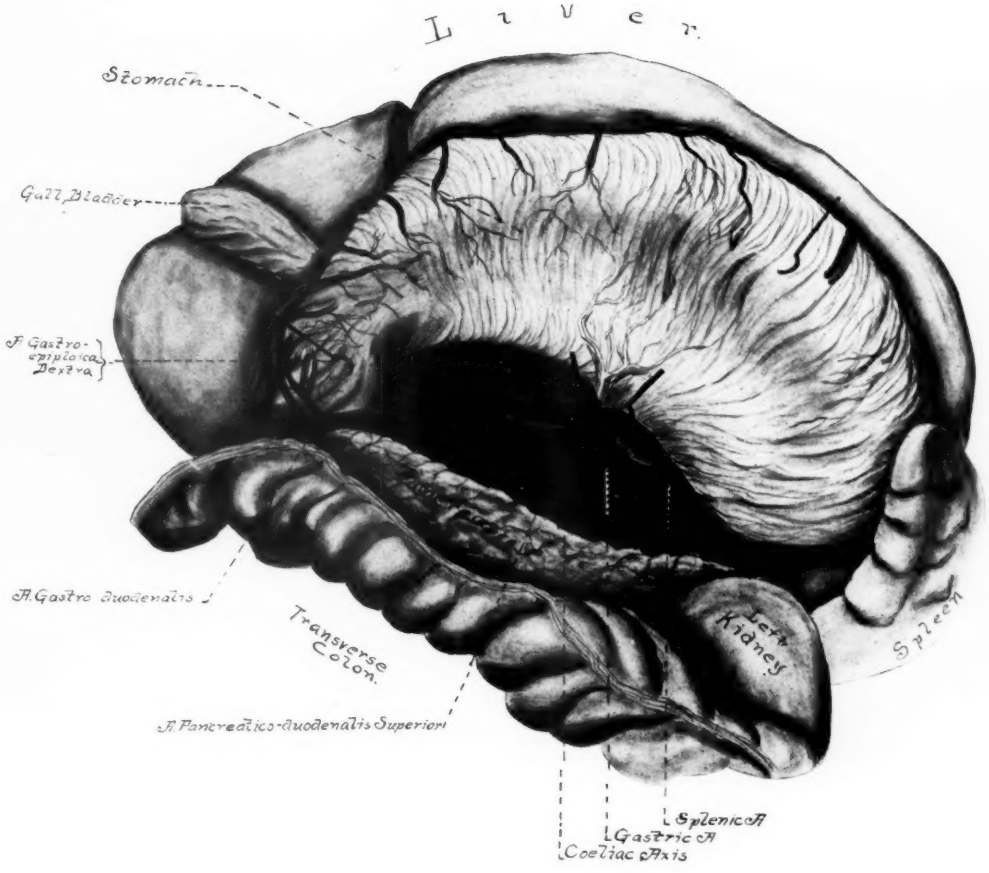

PLATE II.

the liver and supply that organ. I might state in this connection that on a few occasions I have noted a large branch of the gastric artery passing to to the left lobe of the liver, but nowhere in the literature I have had access to, have I been able to find a description of practically a complete blood supply through branches of the gastric artery.

Owing to the fact that some operators are in the habit of doing a preliminary ligation of the gastric artery, in resecting a portion of the stomach, I feel that it may be well to suggest that before doing so, the hepatic artery be located and examined. Since the arteries to the liver are end arteries, and consequently no chance of establishing a blood supply by means of a collateral circulation, the ligation of the gastric artery in a case of this kind would be a dangerous procedure.

THE PATHOLOGY OF NEW GROWTHS OF THE BLADDER[1]

By F. S. MANDLEBAUM, M. D.
Pathologist to The Mount Sinai Hospital, New York

THIS paper is based chiefly on the observation and study of specimens referred for diagnosis to the Pathological Department of the Mount Sinai Hospital during the past nine years, and embraces twenty-nine case of primary tumor of the bladder, and eight of secondary tumor. Among these thirty-seven cases are two, inoperable in nature, in which the specimens were obtained at autopsy. The remaining thirty-five cases were operated upon by the Attending Staff, to whom I beg to extend my thanks for their courtesy in furnishing me with the necessary clinical data. The hospital records show quite a number of additional cases not operated upon, but I have made use only of those in which a microscopic study of the specimen was made.

The most satisfactory classification of these tumors is one which places them in groups according to the tissue from which they have their origin, or of which they are composed. Accordingly, we have for consideration:

1. An epithelial tissue group, in which are placed papilloma, adenoma, carcinoma, and cysts.

2. A connective tissue group, comprising fibroma, myxoma, and sarcoma.

3. A muscle-tissue group, in which are placed the myomata. Besides these, Albarran suggests a group of heterotopic forms, such as chondroma, rhabdomyoma, and dermoid, in which the tumor does not originate from normal elements of the bladder-wall. In all of these groups sub-varieties occur, when more than one variety of tissue is involved in the formation of the tumor, as, for example, adeno-carcinoma, myo- or myxo-sarcoma, and the like.

Before describing in detail the pathological anatomy and histology of the more common forms of tumor, a few words as to their frequency, malignant nature, and etiology may not be out of place. Statistics show that primary bladder tumors, irregardless of their histological structure, comprise about 0.7 per cent of all tumors. The older statistics prove that the cases are quite evenly divided between males and females; but in recent years the percentage has changed in a marked degree, due, no doubt, to improved and modern diagnostic methods of examination of the bladder in the male. The statistics of to-day show that only 9.8 per cent occur in females. This figure gives a variation of less than one per cent in four separate series numbering 560 cases. A similar error also occurred in the older statistics regarding the question of malignancy. Those writers who considered all papillomatous growths as benign, naturally called attention to the greater prevalence of such tumors, while others, who regarded this type as malignant, had opposite views. Only since a more careful microscopic examination has been the rule, have reliable data on this point been obtained. Leaving out of consideration the more unusual forms of malignant tumors and taking only the carcinomata as a type, Albarran found 66 malignant cases in his series numbering 88, or 75 per cent; Zuckerkandl had 21 in 32 cases, or 65 per cent; and I found 19 in 29 cases, or 65 per cent, showing beyond question the large percentage of malignant growths. As a rule malignant bladder tumors remain more or less localized for a comparatively long period, and only in the later stages do metastases develop in other organs. The lymph-nodes, however, may be involved somewhat earlier, notably the pelvic, retroperitoneal, inguinal, or lumbar nodes. Extension of the tumor by direct growth to adjacent organs is not the rule, though this may happen.

Regarding the age at which bladder tumors arise, it may be said that carcinoma, as a rule, is found between the ages of 50 and 60, while sarcoma occurs more frequently in younger subjects, and certain types even in childhood. Many variations from the ages mentioned may be found, as for instance, a case of carcinoma in my series at the age of 25, and a case of sarcoma reported by Kroph[1] in a woman 62 years

1 Zeitschr. f. Heilkunde, Bd. xxv, 1904, p. 247.

[1] Read at a symposium on "New Growths of the Bladder," before the New York Academy of Medicine, March 21, 1907.

of age. The benign tumors may arise at any period. Those in my series occurred between the ages of 18 and 58 years, respectively. As to the question of etiology, but little can be said, although chronic irritation seems to be an important factor in some cases. Calculi, cystitis, the distoma hæmatobium, the irritant effects on the bladder in the manufacture of aniline dyes, as well as psorosperms, have all been noted as being of etiological significance.

Secondary tumors are those arising in neighboring or adjacent organs and growing into the bladder by direct extension. The recognition of their secondary character is of great surgical and prognostic importance, as will be shown later. These tumors frequently originate in the prostate, uterus, vagina, or intestine. Metastatic bladder tumors are of the greatest rarity, and do not come within the scope of this paper.

The first tumor of the epithelial-tissue type to be described is the papilloma. A better name for this tumor, one defining its histological structure more accurately, is fibro-epithelioma, inasmuch as both of these tissues are involved in its production, or, better still, papillary fibro-epithelioma. German writers use this term quite uniformly; but the word "epithelioma," from its common application to superficial or malignant growths elsewhere, may prove misleading, from a clinical standpoint, to those unfamiliar with the term. A papilloma may occur single or multiple in number, and may arise from any portion of the bladder-wall. The typical form consists of a stem or pedicle of from one or two, to six or eight, millimeters in diameter, springing directly from the mucosa, and from a few millimeters to several centimeters in length. Many tufts or villi spring from the pedicle, giving a shaggy appearance to the growth. This is particularly noticeable when the tumor is floated in water, or as viewed with the cystoscope. In the air the villi often collapse, and the whole growth may present a soft, grayish-colored mass, without distinguishing features. The villi usually bifurcate into innumerable branches, closely resembling one another, but varying somewhat in length. When the villi are uniformly short and plump, the tumor has a cauliflower-like appearance. At times a spot is seen on the surface devoid of villi, or an area of ulceration or hemorrhage may be noted. Occasionally a crystalline deposit of phosphates may form superficially. The pedicle, as already mentioned, arises directly from the mucosa and does not infiltrate the deeper parts. For this reason, when gentle traction is made, the mucosa may be lifted from its normal position. When the tumor springs from the trigone this may not occur, as in this situation the mucosa is normally in close relationship to the subjacent tissues. Not all papillomata are pedunculated, and the sessile form with a more or less extensive base is not uncommon. In such forms the villi may be short, and project but slightly above the surface. At times this type is nodular and may contain more fibrous connective tissue than the ordinary villous form. It is then frequently called fibro-papilloma. In size, a papilloma may range from a small tumor, of a few millimeters in diameter, to one nearly filling the bladder. As in all other tumors of this organ, the growth may interfere mechanically with the normal bladder functions, so that urination may be disturbed or hydronephrosis be produced, depending upon its situation.

Microscopically, the pedicle is composed of connective tissue, unstriped muscle fibres, elastic fibres, blood-vessels and nerves, its surface being continuous with the epithelium of the mucosa. A few muscle fibres may extend into the roots of the villi. In the villous portion of the tumor, the epithelial elements as well as the connective tissue fibres combine to form the bulk of the growth. Each villus contains a central core of loose connective tissue, and a blood-vessel with delicate walls, which, at the tip of the villus, forms a distinct capillary loop. Surrounding this central portion are several layers of epithelial cells. The inner layer consists of cylindrical cells radially placed. Above this are many layers of large, irregularly-shaped polygonal cells, while the surface layer consists of somewhat flatter cells, parallel to the long axis of the villus (Fig. 1). This outer layer is often destroyed or absent, and as a rule, it can be seen only between adjacent villi where mechanical injuries are less frequent. The lower layers of epithelium may also be destroyed, by injuries, inflammation, or even by physiological trauma, giving rise to hemorrhage. At

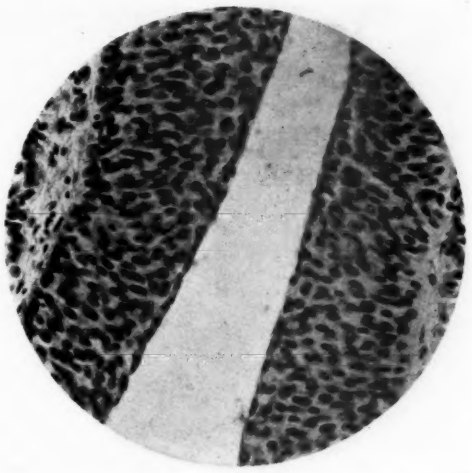

Fig. 1. Papilloma showing flat surface, epithelium parallel to long axis of villus. x 250.

times there seems to be a tendency for several adjacent villi to adhere to each other, but this does not take place unless the surface epithelium is desquamated (Fig. 2). Occasionally small fragments of villi are broken off and may appear in the voided urine. I have had the opportunity of examining material of this nature. In one instance the tissue was perfectly preserved, in two other cases it was necrotic and covered with crystalline deposits. Interference with the circulation, from bending or twisting of the villi, may give rise to marked congestion in the central zone, or to edema of this portion. In one case of a male, aged 41 years, with a papilloma near the trigone, having a pedicle 3 cm. in length, the cystoscope showed villi of a distinctly transparent character. The sections from this growth gave a somewhat cystic appearance near and just beneath the surface. The superficial epithelial cells were all more or less dropsical or edematous, and of large size. All of the cyst-like spaces that were found lined with cells of this type contained a finely granular, almost homogeneous substance (Fig. 3). While this condition may be due entirely to edematous changes, I am inclined to believe that it is similar to a case described by Zuckerkandl,[1] with the production of cysts containing colloid material. Nothing in the history of this case points to a cystitis, nor was there any evidence of a cystitis cystica. Sections of many of the papillomata do not present the typical, long, villous processes described, for many of the denser forms show a fusion of the villi into one compact mass. Such sections appear almost wholly epithelial in nature, with here and there a cross or longitudinal section of the central core (Fig. 4).

[1] Handbuch d. Urologie, Bd. ii, p. 734.

Although papillomata are found frequently in cases with no previous history of inflammation, this condition may supervene and the tumor may then be involved in the inflammatory process. The frequent absence of previous inflammation, together with the fact that these tumors are so often multiple, has led Ribbert[1] to surmise that they arise from some embryological defects in the bladder-wall. In some cases of chronic cystitis, notably the papillary and cystic varieties, there may be a tendency at some point for a marked proliferation of the process. This may give a papillomatous appearance to the bladder at such a site, but the absence of typical villi and the presence of cysts and inflammation, together with the large number of newly-formed blood-vessels in the submucosa, will assist in the diagnosis.

Fig. 2. Section of papilloma. Fusion of two villi on the right, due to loss of surface epithelium. x 50.

[1] Geschwulstlehre, 1904, p. 356.

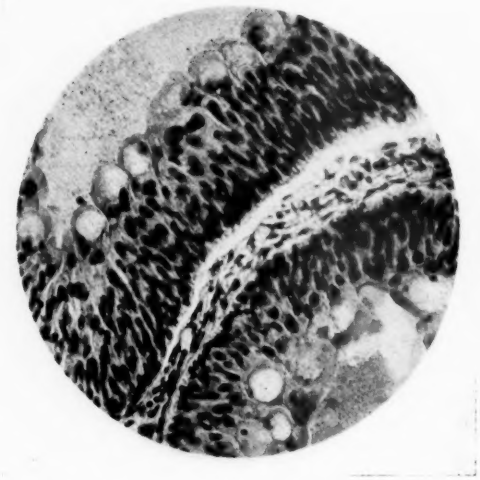

Fig. 3. Section of cystic papilloma with edema of epithelial cells and colloid (?) degeneration. x 250.

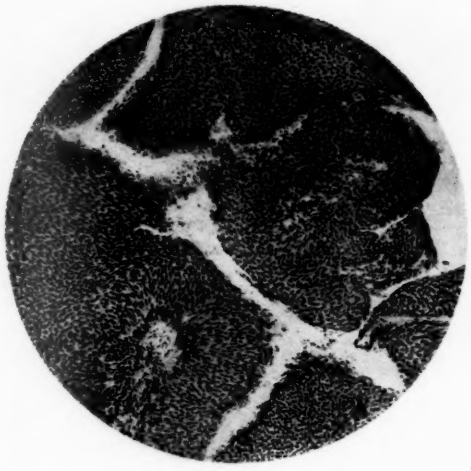

Fig. 4. Papilloma with marked fusion of villi, producing a dense epithelial growth. x 50.

The tendency for papilloma to recur after its removal, is a well-established fact. The growth frequently reappears as a simple benign tumor, though in some instances it may be distinctly malignant in character. At times several apparently benign papillomata may be found, one of which may prove to be malignant. This fact, however, may not be known until a microscopic examination is made, for the two forms closely resemble each other macroscopically, as will be described later.

A most important question now arises. Can a simple, benign papilloma become carcinomatous? While Borst, Lubarsch, and a few other authors deny the possibility, the weight of opinion to-day is confirmative, and Ziegler, Orth, Birch-Hirschfeld, Kürsteiner and Zuckerkandl have described cases which seem beyond doubt to bear out their views. A papilloma which has undergone such a malignant change may not, on gross inspection, present any unusual appearance, but the histological examination shows important changes. The epithelium loses its typical arrangement and uniform shape, and shows a tendency to proliferate into the stroma. These changes may not affect the entire tumor, and here and there a villus of normal appearance is seen. The process begins usually in the deep, epithelial layer, and soon the definite relationship between stroma and epithelium is lost. The villi, later on, fuse together, and finally in some parts of the tumor, all the characteristic appearances of a papilloma may disappear, leaving only a mass of atypical epithelial cells without definite arrangement. Eventually the process extends to the deeper parts and involves the bladder-wall. In other cases the carcinomatous process begins as such in the deep parts, while the papillary portion of the tumor may remain benign, histologically, for a considerable length of time. In one of my cases, the changes in the epithelium from simple papilloma to carcinoma are most striking, and the transition can be clearly followed (Fig. 5). The tumor occurred in a male of 68 years and was a pedunculated papilloma with symptoms of one year's standing. The operation is of very recent date, and therefore it is impossible to give any further history regarding the question of recurrence. Other clinical observations in corroboration of this question have been made, such as the presence of a benign papilloma side by side with a carcinomatous papilloma; and one case has been recorded of hemorrhages for twenty years, after which time a carcinomatous papilloma was removed. From our knowledge of malignant growths, this could hardly have been a

case of carcinoma from the beginning. The statistics of several carefully examined series show that the simple papilloma forms about twenty per cent of the cases of primary bladder tumors.

The next tumor to be described is the papillary carcinoma. From what has previously been stated, it will be seen that this type of tumor is not always to be recognized on gross inspection. In appearance it may resemble the simple papilloma so closely that a microscopic examination alone can decide. It has been claimed that no papilloma should be pronounced carcinomatous unless both pedicle and bladder-wall are infiltrated. This statement is true in many instances and from a clinical standpoint is of value, for when the pedicle is tightly bound down to the thickened bladder-wall, and when the mucosa cannot be lifted off by gentle traction, the diagnosis of carcinoma, as a rule, is fairly established. But the statement has its limitations, especially in those cases where the carcinomatous changes have just begun, and are still confined to the superficial portions. From what has been said it must not be understood that all papillary carcinomata arise from the simple papillomata, for many of them are malignant from the first. In my series this variety of tumor occurred in 16 of the cases, or 55 per cent of all the primary growths. All of the cases were in males, and the ages ranged from 25 to 82 years, respectively, the average being 52 years. In 11 cases the bladder-wall was infiltrated, occasionally by small epithelial nests, at other times by a dense growth. In three cases no involvement had occurred; in two cases it was impossible to determine this point. After removal this form of tumor may recur, not necessarily as a papillary growth, but frequently as single or multiple nodular tumors, or as an infiltration, with or without any villous formation. Ulceration and hemorrhage are not infrequent. As far as its location is concerned, a papillary carcinoma may arise from any portion of the bladder. The prostate was not involved in any of my cases. Histologically, the picture of carcinoma in well-advanced cases is typical. In earlier stages, the epithelial cells lose the typical arrangement as seen in papilloma, and are polymorphous in character, the nuclei become larger and more irregular, an atypical proliferation occurs, and finally the infiltration of the stroma takes place (Fig. 6). Perforation of the bladder-wall is very rare, and metastases occur only in the late stages.

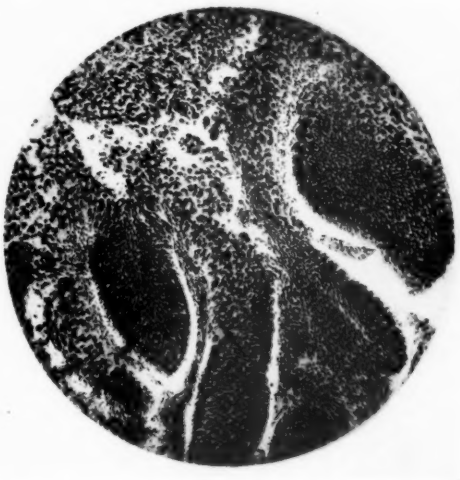

Fig. 5. Section showing carcinoma arising from the lower epithelial layers of a papilloma. x 50.

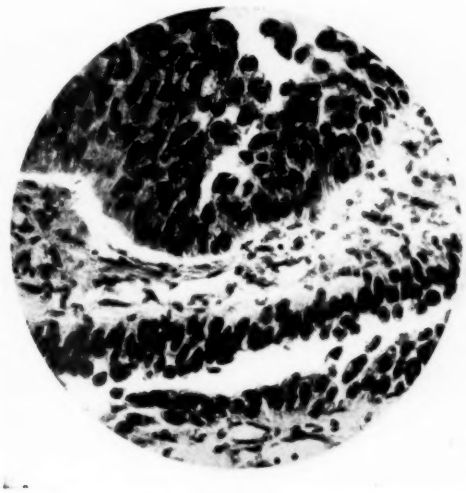

Fig. 6. Papillary carcinoma, early stage, showing a typical proliferation. x 250

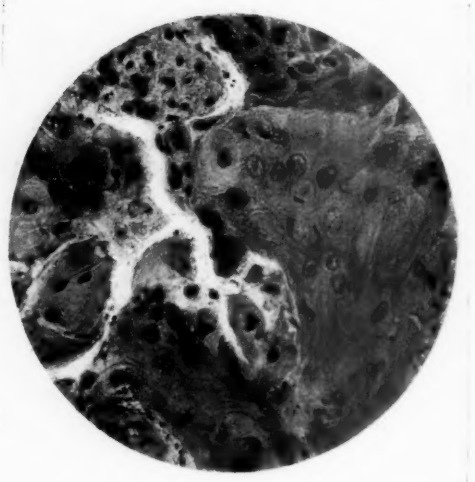

Fig. 7. Section of squamous-celled carcinoma of the bladder. x 250.

The non-papillary forms of carcinoma are somewhat less frequent. The cauliflower type is occasionally met, also the infiltrating form. The latter rarely produces any distinct tumor formation. A simple carcinomatous ulcer is likewise seen at times.

The flat or squamous-celled carcinoma may also be found in the bladder, though it is somewhat infrequent. In my series it occurred in only two cases, both in males, aged 48 and 58 years, respectively. Squamous-celled epithelium is not found normally in the bladder, but may be present as a result of metaplastic changes, due to some form of chronic inflammation. In such an event a carcinoma may arise from the metaplastic epithelium. This type of tumor is hard, as a rule, but a soft form is also described. A tendency to infiltrate the wall is present, and ulceration quite common. In one case quite a large, solid piece of tumor tissue was washed from the bladder, from which a diagnosis could be made (Fig. 7). Epithelial pearls may be found, also cells with keratohyalin granules, but these do not occur with the same frequency as in tumors of this variety in other situations. The prostate was not involved in either of my cases.

Stoerk [1] has described a tumor in which both squamous cells and cylindrical cells were found side by side in the deep parts. In one of my cases this same condition occurred, but I have grouped this case with the papillary carcinomata, which it resembled in every other respect. Only a few squamous cells were present, the greater part of the neoplasm being of the cylindrical-cell type.

Fibro-carcinoma or scirrhus carcinoma also occurs in the bladder (Fig. 8). My series shows five cases of this kind, all in males, with the ages ranging from 52 to 65 years. In every instance the bladder-wall was infiltrated, and all of the cases terminated fatally.

The tumors were hard and dense in structure, and were situated mostly at the region of the trigone and extending along the posterior wall. In one of the cases the tumor was somewhat friable and hemorrhagic. In another instance the inguinal lymph nodes were the seat of a metastatic growth, and in a third case the retroperitoneal lymph nodes were found involved at the autopsy. A medullary type, rich in cells, with relatively scant stroma was observed in one of the cases (Fig. 9).

In the study of these five cases, an observation, which to my mind is of great importance, was noted. These cases were all examined

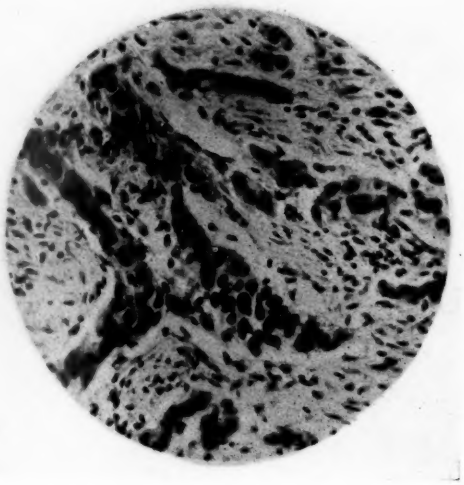

Fig. 8. Section of fibro-carcinoma, or scirrhus, of the bladder. x 250.

[1] Handbuch d. Urologie, Bd. II, p. 744.

carefully before operation, they were diagnosed as new growths of the bladder, and as such were operated upon. But a close study of all of the extirpated tumors, and a post-mortem examination in two of the cases, revealed the fact that four of these tumors were primary growths of the prostate, with a secondary involvement of the bladder. In the remaining case, although the prostate seemed to be quite large and on gross examination presented a hard nodular tumor, this proved to be a fibroma on microscopic examination, and the prostate was not involved. Therefore, as a result of my findings, I am compelled to place four of these five cases in the class with the secondary tumors.

A similar observation was made in studying two cases of adeno-carcinoma, both of which occurred in males, aged 48 and 67 years, respectively. Both cases ended fatally and in each instance it was found that the prostate was primarily affected (Fig. 10). For many years it was believed that the bladder mucosa was devoid of all glandular structure, and even to-day many text-books make this statement. In those cases where a primary adeno-carcinnoma was found, its occurrence was explained on the theory that the aberrant glands from the prostate, which, as is known, may be situated

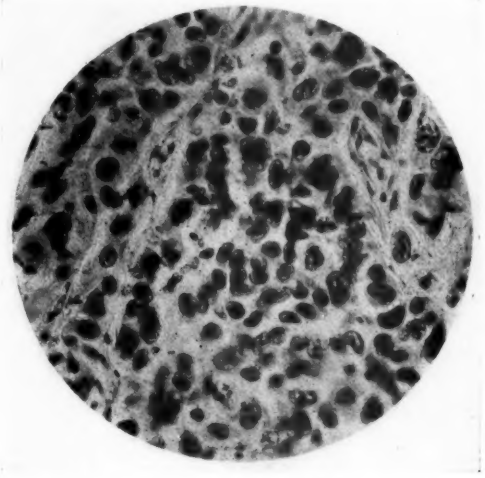

Fig. 9. Section of medullary type of fibro-carcinoma. x 250.

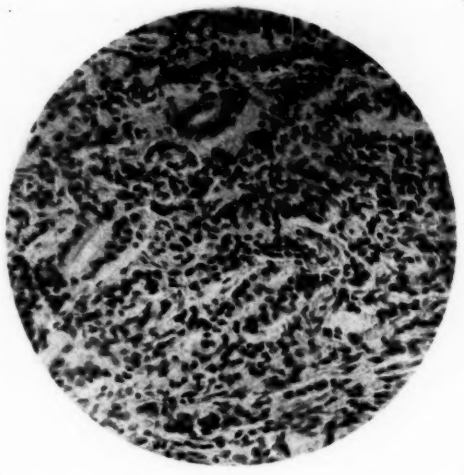

Fig. 10. Section of adeno-carcinoma of the bladder. x 250.

in the bladder mucosa, served as the point of origin of the tumor. This theory, however, is not essential at present, nor would it explain the presence of typical adeno-carcinoma in the female. The fact that glands may and do occur has been established. von Limbeck [1] and von Brunn [2] have described small epithelial buds or processes dipping downwards into the mucosa and forming small rudimentary gland-like structures. These may occur at any age, even in childhood, and do not exist at the trigone alone, but may be found throughout the upper urinary tract. These observations have been confirmed by Aschoff, Lehndorf, Stoerk and others. From these rudimentary glands, therefore, an adeno-carcinoma may have its origin, and Stoerk and Zuckerkandl [3] have published several cases of this type within the past month. In a case of cystitis cystica with marked epithelial proliferation, I have seen glands of this nature lined with cylindrical epithelium, some of which were situated below the surface while others were still connected with the surface. A similar observation was made in the mucosa covering a simple myxomatous polyp, and in both cases these

[1] Zeitschr. f. Heilkunde, Bd. viii, 1887, p. 55.
[2] Arch. f. mikrosk. Anat. Bd. 41, p. 294.
[3] Zeitschr. f. Urologie, Bd. i, 1907.

structures were typical glands from a histological standpoint.

Simple adenoma as well as fibro-adenoma are quite rare in the bladder. Two cases of the latter variety, forming distinct vesical growths were also found to be primary tumors of the prostate. Colloid carcinoma may exist in the bladder but is not common. The glands of Limbeck and Brunn are believed to have an important bearing on the production of colloid carcinoma, for these glands are frequently the seat of epithelial degeneration, and they may then appear as small cysts containing colloid material, from which a carcinoma may arise. In any of the above types of carcinoma a villous growth may be found on the surface, therefore it is important always to examine carefully the deeper portions for a correct diagnosis.

From what has been said regarding the scirrhus and the adenomatous forms of carcinoma, together with the high mortality, I am led to regard them as particularly malignant tumors and would call attention to the importance that the prostate may have in their production.

Cysts, other than those arising from the Limbeck-Brunn glands, may be found as a result of congenital defects connected with the urachus, the Wolffian body, or Gärtner's duct. Cysts of this kind are not common.

Fig. 11. Section of a polypoid myxoma of the bladder. x 50.

The connective tissue tumors are less frequent than those just described and the common forms only will be considered. Fibroma is not often met, and but few cases have been reported. The favorite site is at the base of the bladder, and it is described as a hard growth, often pedunculated, and containing fibrous connective tissue and muscle fibres. It always lies beneath the mucosa, which appears to be stretched over the tumor and not adherent to it.

Myxoma is not so rare a form, and occurs most often in childhood. It may be found as a simple, pedunculated, polypoid growth, or as multiple, rapidly-growing nodules, having a marked tendency to recurrence after removal. This tumor resembles grossly the common nasal polyp, but it is somewhat denser in consistency. Histologically it is composed of branching cells and mucous tissue, and is very vascular as a rule (Fig. 11). The surface is usually covered with normal mucosa. In one case I found a few muscle fibres in the deep portion, evidently near its attachment. Its favorite site seems to be at or near the urethral opening, and in the two cases in my series it was discovered at this situation. One case was in a male child two years of age, and the other in a female of three years. In the latter case the tumor mass protruded from the urethra, and recurred several times after removal. Each microscopic examination showed simple myxomatous tissue. The final specimen which was removed by a supra-pubic operation five months later was found to be a myxosarcoma of a round and spindle-cell type (Fig. 12). The entire bladder was filled with nodular tumor masses and the child died several weeks later. An interesting feature of this case was the presence of metaplastic squamous-celled epithelium upon the surface of the last specimen obtained. Although this case may have been a myxosarcoma from the beginning, there were no evidences of such a condition from the portions removed at the earlier operations, and it is possible that malignant changes developed subsequently. Another case of myxosarcoma occurred in a female aged twenty-two years in which the tumor extended through the bladder-wall and infiltrated the recti muscles, but it was impossible in this case to discover the exact origin of the growth.

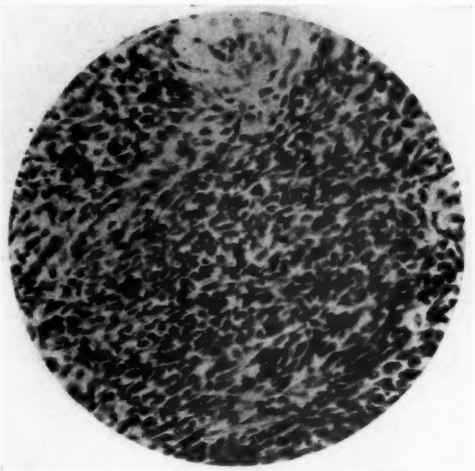

Fig. 12. Section of myxosarcoma of the bladder, round and spindle-cell type. x 250.

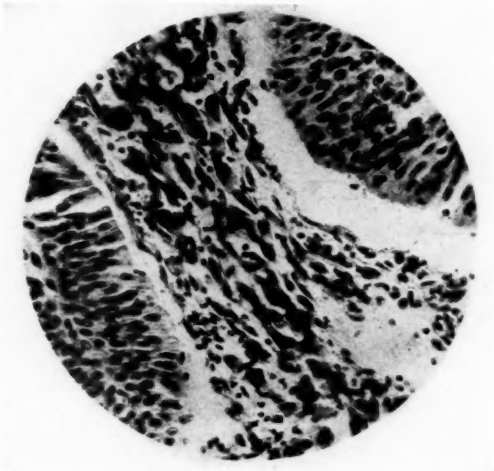

Fig. 13. Endothelial sarcoma of the bladder, growing into the stroma of a superimposed papilloma. x 250.

Other forms of sarcoma may be found in the bladder, but as a rule, they do not have any definite or uniform features. Such tumors may be single or multiple in number, hard or soft in consistency. They are sessile as a rule, but a pedunculated variety has been described. The surface is smooth or nodular and usually covered by mucosa unless ulceration is present. An infiltrating form also occurs, frequently involving the entire thickness of the bladder-wall. One case of this kind of a rare histological type was observed recently in a man fifty-six years of age, who gave a history of repeated hemorrhages for one year and who was distinctly cachectic. The tumor was very extensive, infiltrating the left lateral and inferior walls, and presenting a partially necrotic and hemorrhagic surface. There was no apparent involvement of the prostate. The microscopic examination revealed an endothelial sarcoma, inflamed in parts, and growing upwards to the mucosa. A simple papillomatous tumor arose from the mucosa at this situation. The extent of the sarcoma is very sharply defined at this site, and although the tumor grows actively in the fibrous stroma of the papilloma, in no place are the epithelial cells of the papilloma disturbed or involved by the malignant growth (Fig. 13). It is interesting to note that about 30 per cent of the reported cases of sarcoma have been found in females.

Myoma of the bladder is not common. It arises directly from the muscle fibres and may be single or multiple. There is nothing characteristic in its gross appearance, but as a rule it is covered by normal mucosa and is nodular in form. This tumor is regularly of the unstriped muscle variety, but rhabdomyoma also has been reported. Only one case of dermoid of the bladder is known; that described by Thompson.

Besides those already described, my series contains a case of lympho-sarcoma with the primary growth in the appendix, and a case of round-celled sarcoma of prostatic origin in which the bladder-wall was infiltrated and measured 2 to 4 cm. in thickness.

NOTE: Since the above paper was written, an autopsy was performed on the case of endothelial sarcoma, and several smaller tumors were found in the bladder-wall, many of which extended but slightly above the surface of the mucosa. From the left wall of the bladder a large tumor mass extended to the bony pelvis, to which it was adherent. Extensive metastases were found in both kidneys, in the lungs, and under the visceral pleura, and a few on the surface of the liver. One small metastasis was present in the right lobe of the prostate, which also contained a small abscess. Microscopically, the various metastases presented the same general structure as the primary growth in the bladder.

CASE OF TUMOR OF THE CAROTID BODY

By JEROME E. COOK, M. D., St. Louis, Missouri

THERE is always a certain amount of interest attaching to a rare pathological condition, so that I feel no excuse is necessary in presenting this case, though I have nothing to set forth which has not already been written about.

The last paper on this subject was by Keen and Funke, *Journal of American Medical Association*, xlvii, Nos. 7 and 8, wherein all the previous cases are reviewed, and the authors add a case of their own, which stands twenty-seventh and last in the series. My case will therefore be the twenty-eighth in the literature.

Patient J. W., mulatto, age 39, entered St. Louis City Hospital January, 20, 1906, and was assigned to my service. About 16 years ago he noticed that a lump was growing on the left side of his neck, which gave him no pain, but grew very slowly and steadily larger. About nine months ago he had this lump operated upon, and was confined to the hospital about four months thereafter. The size of the growth is about the same as before the operation. During the past year he has had several fainting spells, and since the operation, has been very weak indeed, being in bed most of the time. He was told after the operation that he had a "blood tumor" on his neck, and that he would have to lead a very quiet life or it would rupture and kill him.

Fig. 1. Showing appearance of tumor four months before second operation.

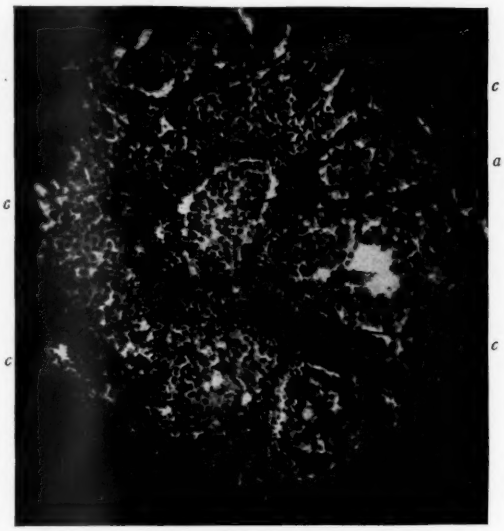

Fig. 2. Showing the glomeruli-like structure of the tumor (a), the capillaries filled with blood (c), and the spots of yellow pigment (c).

Physical Examination shows a somewhat emaciated mulatto, mucous membranes pale, tongue slightly furred. Pupils equal and react well. Patient gives the appearance of a neurasthenic, says he feels too weak to sit up in a chair, and talks scarcely above a whisper. No difficulty in swallowing.

Thorax. Bony landmarks prominent, chest expansion fair, resonance good, area of cardiac dullness not increased, no murmurs or accentuated sounds. Abdominal walls flaccid. Liver and spleen of normal size, no tenderness, ascites, etc.

Local. On the left side of the neck is a large mass, with a fairly smooth surface and even outline, raised like a plateau a full inch above the surrounding surface, with sides of moderate slant. It extends from the tip of the mastoid above, to the level of the cricoid cartilage below, and from the side of the thyroid cartilage in front to within 1½ inches of the ligament nuchae posteriorly. Running obliquely upward and backward from the anterior border is a scar, slightly depressed, dark red in color, and looking as if it were on the stretch (Fig. 1). There is some pulsation of the mass, which is more evident upon

Palpation. The mass is then expansile in all directions, is not movable, is to some degree compressible, and has a peculiar elastic feel. The expansile pulsations are synchronous with the heart-beat. Strong

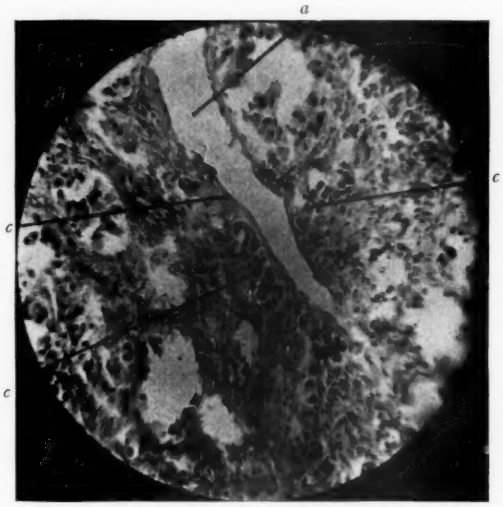

Fig. 3. Dilated empty capillary (a), showing endothelial lining (c), and the grouping of the acini about it (c).

pressure over the carotid, below the tumor, causes it to become somewhat smaller, and the force of the expansile pulsation much diminished. The pulse in the left superficial temporal artery is not palpable; that on the right is plainly so. On auscultation a harsh bruit is heard, over the left common carotid, beginning beneath the clavicle and extending up to the tumor; over the tumor a much higher pitched and softer bruit is heard and these are elicited without any pressure.

A probable diagnosis of carotid aneurysm was made, and the patient was operated upon February 3, 1906, by Doctor John Young Brown. The hemorrhage was, from the beginning, excessive, there being constant oozing which could not be controlled by hemostat or ligature. Internal jugular vein and common carotid were ligated with some difficulty, which diminished but did not entirely check the hemorrhage. There was no cleavage line between the tumor and the surrounding tissues; in some parts of the tumor there was a definite capsule, but in most parts it fused with the adjacent structures. The tumor with the carotids was excised. The patient had done poorly from the first, had lost considerable blood, and at the close of the operation was in profound shock. He died within an hour. Autopsy not obtained.

The tumor when removed appeared considerably smaller than would have been expected from the appearance of the patient before operation. It measured 7 x 5 x 5 cm., was dark red on the surface, and on section a pearl-gray, tinged slightly red. There was no definite smooth capsule, the appearance, however, was more as if the surrounding tissues had grown into the boundaries of the tumor, than that the tumor had invaded the adjacent structures. The common carotid artery entered the lower part of the tumor, which surrounded it and its two branches completely at the point of bifurcation, encroaching somewhat upon the lumen. The endothelium of the arteries was smooth and in no place did the tumor cells penetrate into the lumen. The consistence was quite firm, somwhat resilient, but could scarcely be called elastic. On section the tumor appeared full of channels, which radiated outwards from the large vessels.

Microscopic examination shows the typical pictures so well described in the previous articles on the subject (Fig. 2, 3, and 4). The large bands of dense, hyaline connective tissue, very poor in nuclei; the acinus-like structure with the "Hohlräume," and in parts a glomerular structure; the large cells with ill-defined boundaries, grouped in places here and there into cell-balls; the giant cells; the nuclei of varying sizes, some enormously large with a very well-marked boundary and a well-defined interlacing chromatin network with one or more nucleoli; the larger blood-channels — they can hardly be called vessels, for the walls show no elastic fibres by the Weigert stain — partially filled with blood-cells and a homogeneous substance, which has also infiltrated the walls of these channels, pushing them out into the lumen; the smaller capillaries, usually empty in this case, bordered by acini; and the spots of golden-yellow pigment most numerous where the capillaries are well filled with blood.

These tumors have been classified as carcinoma, sarcoma, endothelioma, etc., but, until

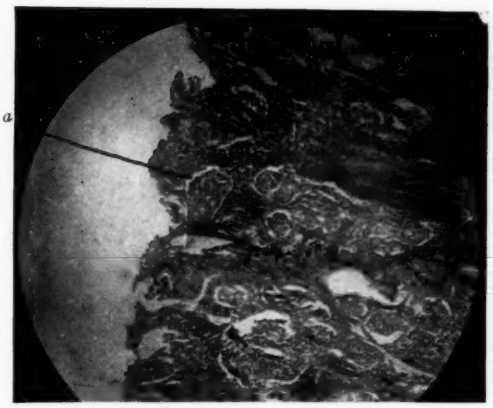

Fig. 4. Showing the "Hohlraume" (a), and a large band of hyaline connective tissue (c).

we are better informed as to the nature of the cells of the carotid body itself, it would be well simply to call these growths tumors of the carotid body.

This is the first case reported occurring in a man with negro blood, and the second case which has been wrongly diagnosticated as carotid aneurysm.

For further study see the article by Keen and Funke mentioned above, also an excellent paper by Mönckeberg in *Beiträge zur Path. Anat. und Allgemeine Pathol.*, Jena, 1905.

I wish to acknowledge my thanks to Dr. John Young Brown, superintendent of the City Hospital for the privilege of observing and reporting this case; also to the Pathologic Department of Washington University for aid in the preparation of same.

GANGRENE AND ECLAMPSIA[1]

By CHARLES B. REED, M.D., Chicago

GANGRENE in association with eclampsia is a very rare phenomenon, but in addition to this fact, the cases herewith reported are of exceptional interest since, on account of the history and the accompanying circumstances, they could be so readily confused with burns, to the great reproach and discomfiture of the attending physician.

Case 1. Mrs. E., nervous type, aged 29, both parents living and well. Family: One cousin died in eclamptic attack of 9 hours' duration, child (living) delivered about 4½ hours before death of mother. Undertaker reported severe burns on body when he took charge. Brother of patient has very sensitive skin, a weak solution of hyd. bichlo. applied to skin produces urticaria, and, in one instance, a urethral injection of the same resulted in a dermatitis which extended from the umbilicus to the middle of the thighs. The patient herself has always had a very sensitive skin and in two instances severe urticaria resulted from the application of zinc oxide adhesive plaster.

The pregnancy was normal in every respect. Frequent examinations of the urine by her physician, Dr. Weiskoff, never showed an albumen. Labor began in the evening of July 4, 1905. As the conditions seemed favorable the doctor left her for a time to the care of the nurse who was instructed to call him when necessary. At 12:30 A. M. Dr. Weiskoff was recalled and found the patient unconscious. A short time thereafter she had a distinct convulsion for which chloral, bromides, morph. sulph., and chloroform were employed. At 6 o'clock in the morning of July 5, Dr. Weiskoff asked Dr. Reed to see the case. Immediate delivery was done and a deeply asphyxiated child was delivered in which no respiratory reaction could be developed. The patient's temperature at this time was 90°F. and artificial warmth was supplied by means of hot-water bottles which were first tested upon the hands, the flexor surface of arms and cheeks of the attendants, and then wrapped in towels and laid next to the limbs, but *outside* the sheet which covered the limbs. The patient continued unconscious for 3 days, but artificial heat was not employed after the first 6 hours.

Eight hours after delivery, the nurse called the doctor's attention to the condition of the legs which she thought had been burned. The hot bags had been placed as follows: One between the thighs, one on the outside of each thigh and one against the outside of each leg below the knee.

At each point where the bag had lain against the flesh there was ultimately loss of tissue. The process would begin with a whiteness that passed into a superficial pink and then reddened like a light sunburn which lasted for a day or so and then a gangrenous breaking down of tissue followed. The largest place was on the outer side of the left thigh, measured 3 x 10 inches, and extended far enough below the surface to expose the muscle.

On the third day of the puerperium a spot appeared over the head of the tibia, 4 inches in diameter which in a short time broke down and the ulcerative process did not cease until the bone was denuded of periosteum for a space that was an inch in diameter. On the tenth day another spot, about 2 inches in diameter, formed on the outer side of the calf of the leg.

The first dressings were of zinc oxide gauze, retained by adhesive strips of zinc oxide plaster, but bullæ formed wherever the plaster came in contact with the skin and it was abandoned for oil and wet dressings. The two places on the inside of the thighs, the two on the outside of the thighs, the one on the calf, and one of the tibial areas healed in about 4 months, the deeper tibial injury required 6 months.

Case 2. Mary McD., aged 19, entered Cook County Hospital in the service of Dr. Henry F. Lewis, December 20, 1905, in eclampsia; temperature 104°F., cyanotic; pulse 124; frequent convulsions; immediate

[1] Read before the Chicago Gynecological Society at the meeting of April 19, 1907.

delivery by Dr. Lewis, one convulsion postpartum, comatose 36 hours. Hot bricks were used, each one being tested on the face of the nurse before application. I came on duty the next day and found on the outer surface of right lower leg an area of slight redness 8 x 3 inches which in a few days broke down over the entire area and the resulting slough eventually exposed the muscle.

Another spot as large as a dollar appeared on the ball of the right foot and also sloughed, though not as deeply as on the calf above. It was 6 weeks before the patient was well enough to leave the hospital.

CASE 3. (Gutbrod, *Zeitschrift für Geburtshülfe und Gynäkologie*, Bd. xlviii, 1902.) Patient 22 years old; eclampsia, hot packs, etc., put to bed with left hand under back and left foot crossed over right foot. The tissues broke down in a few days on the sacrum where hand was placed and at the point of contact between the ankles. Forty-six days after beginning of the illness the patient had improved generally, but the tendons of the right foot had been exposed by the slough, suppuration burrowed into the foot until finally it was necessary to amputate.

CASE 4. (Gutbrod, *Monatschrift für Geburtshülfe und Gynäkologie*, Bd. xxi.) V. P., 47 years old; fell into eclamptic attack when near term. Labor spontaneous; attacks recurred after delivery. Next day patient awakened from coma but exhibited signs of psychosis. Urine slightly albuminous; temperature 39°C.; mentally clear on the ninth day when she got up; temperature had been normal for 5 days but on the evening of this day it rose to 41°C.

On the left big toe the skin became black and blue, the entire foot deep red and even up to the knee. Mind again clouded. An ulcer formed on the right cornea, an abscess on the outer border of right foot and later one on the calf that required incision. A deep ulcer formed on the back of the foot which was slow in healing. The process did not entirely heal for 4 months.

It is very important in all these cases to establish the fact that the destruction of tissue resulted from some internal condition, that it was of necessity gangrene, instead of, for instance, a burn as might be surmised.

It is highly improbable that a burn could result from an application where the degree of warmth was so carefuly tested on the persons of the attendants. Nor is it plausible to suppose that the difference between a normal temperature and the application could be responsible for the condition since even though the patient's temperature was only 90°F. the difference between the temperature of the body and the temperature of the hot applications was not enough to produce a burn.

Further, the character of the injury did not conform to the pathology of a burn where the most intense injury would necessarily be on the surface of the skin at the point of contact, while the apex of the pyramid was deep below the surface.

Only a transient hyperemia followed the removal of the hot applications and then the process went on as described, constituting a sequence of clinical symptoms never seen after a burn of any degree, so that evidently the heat alone was not responsible for the condition. That pressure alone did not produce the necrosis is apparent from the fact the flesh at the points of contact with the bed was not affected; hence the pressure and the heat must be associated with a *third something* which the patient herself furnishes.

Whether or not any given injury will cause necrosis does not depend wholly upon its nature and severity, but is influenced to a considerable degree by the condition of the affected tissue at the time of its occurrence. Thus, if a tissue has been subjected for a long time to the depressing influence of an impaired circulation, or if its vitality has been lowered by marasmus or hydremia, or any diseased condition of the blood, it dies much more easily than if it had been previously healthy, as for instance, in the necrosis of the extremities of the aged, and among those who suffer from uncompensated heart lesions.

Furthermore, disturbances of the nerves of the vessels in so far as they lead to impairment of the circulation may afford a predisposition to necrosis. Thus in typhoid conditions comparatively slight pressure of hip, elbow, sacrum or heel, may determine gangrenous destruction of skin and subcutaneous tissue.

The primary pallor of the tissues would indicate an interference with the circulation, such as an embolus would produce, with a subsequent sloughing off of the dead tissues.

A necrosis also might occur from the transient interference with the blood supply by a spasmodic contraction of the vascular muscles. A similar result may be obtained from a retardation of the blood current, due to weakness of the circulation as a whole, or partly, indeed, to local changes in the blood-vessels themselves, especially in the presence of trauma.

None of these hypotheses however seem entirely satisfactory. The most plausible solu-

tion lies in the presence of a chemical irritant in the blood itself, which so alters the character of that fluid that a breakdown of tissues readily occurs in the presence of a determining factor.

Thus we find analogous cases in other diseases, notably in diabetic conditions where a very slight inflammation excited in the ill-nourished tissues may determine a form of moist gangrene; and under the same conditions, at points of small resistance, with or without a determining factor, diabetic ulcers may appear.

A pertinent case occurred in the service of Dr. Schroeder at Wesley Hospital, which he has courteously permitted me to report:

> Mrs. W., aged 57, entered hospital April 10, 1906, with a history of a 2 weeks' old infection of second toe of left foot. The presence of sugar in the urine made clear a diagnosis of diabetic gangrene and the toe was amputated. On the third day after the operation she complained of pain in the foot and a bottle of hot water was applied to the foot under which a blister formed. Gangrene of the skin with sloughing of skin and tendons followed which extended to the middle of the leg for which amputation was done above the knee 3 weeks later. The patient died from general sepsis.

The importance to us of this new gangrenous area lies in the fact that its location was entirely separate and apart from the site of the original disease, and that usually such conditions spread by continuity. It seems, therefore, highly probable that a chemical irritant, with approximately the same formula, should be found circulating in the blood of the diabetic and the eclamptic.

Such a common factor could easily be supplied by the presence of acetones or diacetic acid which is such an important factor in diabetes mellitus. Max Stolz (*Archiv für Gynäkologie*, 1902) has shown that there is an increased acetonuria during labor, especially in the primipara, which is greatly intensified during the first 3 days of puerperium.

Essendon (*New York Medical Journal*, April 14, 1906) even goes so far as to attribute postpartum eclampsia to diabetes, on the strength of two cases which he reports, wherein no albumen was present but 3 to $3\frac{1}{2}$ per cent of sugar was found in the urine, while many papers have been presented with the idea of explaining the eclamptic convulsions on the theory of an acetonuria. In both cases the presence of acetone or diacetic acid would determine an endarteritis obliterans through the circulation of a deficient quantity of abnormal blood, an effect which in the first case herein reported would be greatly aided by the abnormal susceptibility of the patient's skin to irritation.

It is possible also that some or all of the cases of gangrene of the uterus, following labor, may be directly or indirectly traceable to the same etiologic factors, as in the cases herewith reported.

Since a malpractice suit for injuries attributed to burns could so easily be inaugurated, it is important to emphasize the great value of reporting such cases from the medico-legal standpoint.

Inasmuch as a careful search through the accessible literature has failed to reveal any other cases of this kind except Gutbrod's and my own, the inference is permissible at least, that these phenomena have been regarded as burns, and the truth concerning them suppressed, for it is not probable that such cases have not occurred and it is hardly probable that such interesting conditions could long go unreported. A few cases of gangrene in pregnancy have been reported, but affecting the legs particularly, as Powell (1 case), Swayne (1 case), and Wormser (10 cases), show, while Blackman's case of thrombosis of both legs, with gangrene and amputation of one following an attack of eclampsia, although interesting and instructive, is not exactly a parallel instance unless we regard our own case as one of multiple spontaneous gangrene due to capillary embolism.

If embolism be accepted as explanatory, the etiology still remains as obscure as before — as obscure for instance, as the etiology of such analogous phenomena as those recognized respectively as Raynaud's Disease and Roentgen-ray gangrene. Whether these interesting correlated phenomena will or will not be eventually reduced to a least common multiple, can be answered only by those who analyze the remote neurons of the cerebro-spinal and sympathetic systems, or by the patient workers in the mysterious chemistry of the blood.

PROF. DR. GARRÈ

DEPARTMENT
NICHOLAS SENN FESTSCHRIFT

ON RESECTION OF THE LIVER

By PROF. DR. GARRÈ
Director of the Surgical Clinic of the University of Breslau

Translated by Emil Ries, M.D

IN injuries of the liver, as well as in resections of this organ, hemostasis presents the greatest difficulties. A number of methods have been invented, part of which have been tested successfully only in animal experiments —methods which are more or less complicated, and cannot be employed in practice without special preparation. But no method can be introduced into general surgical practice unless it can be executed with most simple means, which every operator has at hand.

By the report of a number of cases of resection of the liver which I have performed, and some of which represent extensive operations, I hope to prove that with some management the dreaded hemorrhage from the liver can be mastered by isolated ligation of vessels with silk and deep constricting suture of the wound with catgut. Hitherto Paquelin's cautery has probably been used most extensively in diffuse parenchymatous hemorrhages, but in large and deep resections it has answered the purpose only in a few cases. Frequently the hemorrhages have become quite grave, and have obliged the operator to employ other and more energetic methods of hemostasis.

If large hepatic vessels bleed, I consider it wrong to use the thermocautery. The operator unnecessarily loses time, the patient blood.

Besides, the eschars make it difficult to grasp the vessels individually. He who ventures upon an extensive operation upon the liver, must not rely on the cautery any more than on the other thermic methods of hemostasis, which are still in their experimental stage in surgery. Snegirew's steam spray and Hollænder's hot air method cause necroses, which imply the danger of secondary hemorrhage.

Not much is to be expected from preventive hemostasis in the liver. As soon as the operation has advanced from the edge to the central portions of the liver, it is hardly possible to apply clamps which compress the bulky liver sufficiently to secure a bloodless operation. Nevertheless, for the sake of saving blood, it will be advisable to make as much use of these methods as possible in the beginning of a liver operation, as I have done repeatedly. For this purpose I have used Doyen's elastic stomach clamps. Any other long clamp does the same service, provided that it has a long catching device,

otherwise it has to be kept locked by a rubber tube attached to the handles and well stretched. This method is liable to produce embolism of liver cells as soon as the liver tissue is crushed by too energetic compression.

Masnata had Lollini in Bologna construct such a liver clamp (pinca epatoctona), which was provided with threads and was to facilitate the resection.

Of course, parts of the liver may be compressed in the course of the operation by the hand of the assistant, provided that there is sufficient space for such manipulations.

Langenbuch's proposal to produce preventive hemostasis by temporary ligation of the portal vein, cannot be accepted without grave objection.

Packing the bleeding hepatic wound has to be considered more in the case of injuries, where it can be combined advantageously with other methods, as ligation of vessels and suture, for mostly one method alone will not suffice. We agree entirely with Wilms, who recommends packing warmly in injuries of the liver. But we believe that packing ought to be considered last of all in resection of the liver, where we must try to primarily close the laparotomy wound.

I cannot understand how Ransohoff (*Medical News*, April 16, 1904) can arrive at the conclusion that immediate closure of the laparotomy wound is to be rejected unconditionally. It is true Wagner and Langenbuch saw fatal interperitoneal secondary hemorrhages, but Ransohoff himself parallels these cases with an extraperitoneal hemorrhage, also with fatal termination. Where is the difference? The outcome depends not on the relation of the wound to the abdominal walls, but on the method of hemostasis, and Luecke's method of elastic ligature, which Ransohoff has employed, has to be considered antiquated and dangerous.

Other surgeons, too, believe that the method of leaving the abdomen open over the packed liver might be improved upon, and have tried other ways. Snegirew, for instance, sutured omentum over the liver wound for hemostasis, but this method has proved unsatisfactory on account of the insufficient firmness of the material employed.

Baldassari (Ferrara) therefore employed, as a more resistant material for his experiments, flaps consisting of serosa and muscle, in a way similar to that tested experimentally by Beck (*Journal Am. Med. Association*, April, 1902). He cut from the edge of the laparotomy wound a flap consisting of peritoneum and transversus muscle, and sutured it widely to the bleeding wound of the liver. As usual, the catgut threads cut into the liver parenchyma on being tied, but the transplanted muscular flap offered sufficient resistance for the arrest of the hemorrhage.

The muscle flap was absorbed in a comparatively short time, and at the post-mortem Baldassari found the site of the muscle covered by cicatricial connective tissue and extensive omental adhesions.

There are some objections to this method. The field of operation in the

liver is not always so free from bacteria that a cautious operator would risk to implant extensive parts of organic tissue, which becomes necrotic. Besides, as the author himself states, such muscular flaps cannot be employed in extensive resection of the liver, as it is impossible to obtain the flaps of sufficient size.

But I venture to ask, is not this method unnecessary in small resections?

The elastic ligature also belongs among the unsafe methods. In pedunculated tumors it is not needed. In tumors imbedded in the substance of the liver, it is impossible, or at least quite unsafe. It slips too easily. Filippini's results cannot change my opinion.

In all cases where the resection passes through a pedunculated part of the liver, it is undoubtedly more correct to apply one or several intra-hepatic constricting ligatures, for preventive and final hemostasis. Strong silk or catgut may be used. The threads cut deep into the tissue, hemorrhage occurs also from the furrows of the constriction.

Therefore, Casati in two cases, both successful, used the edges of the abdominal incision to support the constricting ligature. After uniting the parietal peritoneum with the serosa of the liver, he applied a mattress suture in such a way that the wound in the liver was compressed between the two edges of the laparotomy wound. Thereby the liver stump was given an intramural or intraparietal position. In a similar fashion, Chapot-Prevost took care of the liver in separating a xiphopagus. This method presupposes a movable liver stump, but this is absent in the most difficult operations. Beck (l. c.) found this method successful in his animal experiments.

Many operators are afraid of the threads cutting through, and consider this a difficulty which makes direct suture and ligation *en masse* impossible. Our own experience demonstrates sufficiently that this dread is not well founded, though exceptionally grave difficulties may arise from abnormal lack of firmness of the liver and its vessels, as for instance in fatty or amyloid degeneration of the liver.

For this reason some operators have placed rolls of iodoform-gauze under the threads, and of course, left the wound open. As absorbable material for the compression of the liver, ivory, decalcified tubular bones of chickens have been recommended, which are to be threaded like pearls, or as Ceccherelli proposes, small decalcified bone plates are to be placed on the anterior and posterior surface of the liver, and are to cause preventive and final hemostasis by being tied together with threads.

Following the same principle, Payr and Martina, in 1905, (*Archiv. f. Klin. Chir.*), published a procedure of preventive hemostasis and union of the wounds of the liver, which, while well worthy of consideration, is not free from disadvantages and cannot be improvised. These authors employ narrow, perforated plates, consisting of pure magnesia metal of varying lengths. These plates are pressed firmly against the upper and lower surface of the liver over or laterally from the lines of resection, and are fastened with

catgut threads which are passed through the liver with blunt liver needles, and are drawn moderately tight and tied over the plates. Thus the resections can be performed under preventive hemostasis and the wedge-shaped wound of the liver can easily be united by marginal sutures.

As is well known, magnesia is decomposed under considerable development of gas (1 gram of magnesia is able to produce 1 litre of hydrogen). Gas cysts are formed, and besides, in consequence of the chemical and mechanical irritation, masses of connective tissue and adhesions arise, which could only be kept down by omental plastic. These certainly are some drawbacks.

It was long supposed to be impossible to ligate individual vessels of the liver, because they were thought to be too brittle and too easily torn, and for the same reason nobody cared for suture of the liver.

Kousnetzoff and Pensky undoubtedly deserve great credit for having shown that the vessels in fresh, human livers are no less resistant than arteries and veins of similar caliber in other parts of the body. Their walls therefore present sufficient firmness for isolated ligature.

Besides, Auvray, who confirmed their results, could demonstrate that the hepatic vessels, in consequence of their elasticity, can be drawn up from the cut surface of the liver. This can be done to the extent of 1 cm. and this is additional evidence of the possibility of safe isolated ligature.

If a circular suture of a vessel or a bundle of vessels has been performed, ligature will and must be successful, however far the thread may cut into the soft parenchyma. Kousnetzoff and Pensky have proven this by the success which they had with their method of intrahepatic ligature in resection on animals, and Anschuetz reports from Mikulicz's clinic that the method has proved successful there (*Sammlung Klin. Vortr.* No. 356-357, 1903). Here the literature of this subject is reviewed extensively.

The method consists in applying ligatures *en masse* in a continuous row, so that no tissue remains free between them. The threads, when drawn taut, crush the liver parenchyma, but the vessels resist. They are held and tied together like sheaves.

Auvray has modified the method with regard to the introduction of the threads. Both methods had their precursor in Bonanno's procedure, published 1890. It is unnecessary to mention the numerous other modifications of the intrahepatic ligature as recommended by Fabbrini, by Troiani, by Giordano, 1902, by Masnata, 1903. They are not less complicated, and therefore, as I believe, no improvements.

The blood pressure in the vessels of the liver is low, therefore hemostasis easy. A frequent mistake is made by pulling too hard on ligature or suture in the liver. This is not only unnecessary, but harmful, because the constricting thread can slip from the vessel in the parenchyma.

It is not rare to hear an operator complain of the impossibility of applying hemostatic forceps. Anschuetz explains, as I believe correctly, this apparent contradiction by showing that in the careful and blunt dissection in the liver,

the bundles of vessels are first stretched to the extreme before being cut, and in consequence of their elasticity, retract when cut behind the cut surface. Then it will be a vain endeavor to achieve hemostasis with artery forceps.

Another difficulty results from the fact that on the cut surface of the liver the large veins are frequently opened in an oblique direction. It is difficult, then, to apply forceps and even more difficult to apply ligature, because it slips easily. Then a small, circular suture is properly used.

The majority of operators prefer catgut as ligature material, and incline to require it most of all in liver surgery. This is an error. I believe, on the contrary, that fine silk threads are of much greater service. Catgut swells and slips much more easily, while fine silk thread cuts smoothly into the parenchyma, is caught by it, and compresses the lumen of the vessel securely. I use silk No. 0000 (Pearsall's) and have never seen any disadvantages such as secondary suppuration. These fine ligatures heal in without trouble.

For the deep sutures which go through the whole thickness of the liver, I prefer thick catgut, (No. 2) because I consider thick, firm sutures more correct, and because I have a general dislike to burying thick silk threads. I am afraid the latter might now and then cause secondary disturbances. On the other hand, I do not hesitate to use silk No. 2, interrupted or continuous, for the threads uniting the serosa of the liver.

As the records of my cases prove, I have succeeded in all cases with these simple methods of isolated silk ligature of the large vessels, and interrupted through sutures of the parenchyma with catgut. All my resections of the liver have recovered. I had no secondary hemorrhages or other complications. Whoever takes the trouble of looking through the short case-records at the conclusion of this paper, will see that there are among them quite extensive operations, resections in which I have penetrated the liver substance to the extent of 10 to 14 cm. from the edge. It is not to be denied that some of the hemorrhages have been quite considerable, or that the situation became critical now and then, but hemostasis, as well as the proper treatment of the wound, could always be carried through. The treatment of the wound was always done by the intraperitoneal method, with one exception. The laparotomy wound should always be closed completely. I attribute great importance to this point.

While so far these simple means have been satisfactory in my practice, it does not follow that all of the other methods are useless, which have been worked out with so much acumen and have stood the test of experiments and occasional application in surgery. Given the case of a difficult surgical situation, it will be well to remember those methods, to apply them and to test their value. But I do not doubt that the simple and easily improvised methods will prove victorious, such as the simple catgut suture, after Kousnetzoff and Pensky, and eventually the compression between plates, after Ceccherelli and Payr.

The mortality of liver resections is calculated to be 15 to 20 per cent. But

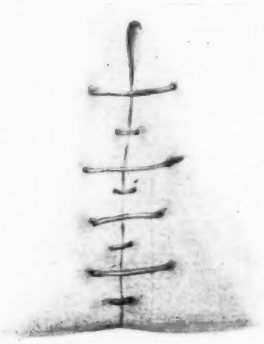

Fig. 1.

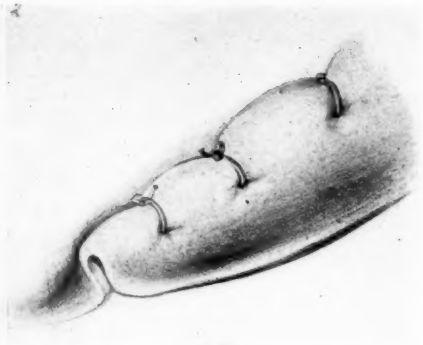

Fig. 2.

we have the confident hope that improved methods and increasing experience will show better results.

I have had the good fortune not to lose any of my cases of resection of the liver, and have seen neither secondary hemorrhages nor lung complications (embolus).

The operative interference is comparatively simple in carcinoma of the gall-bladder, which has invaded the liver without making metastases. A wedge-shaped resection of the edge is usually sufficient, and the two surfaces of the wound can easily be united by suture. In the majority of cases, isolated ligatures of vessels were not needed. Hemostasis is achieved satisfactorily, by pressing the wounded surfaces together by gently drawing on the suture. I have repeatedly had the impression that the contact of two smooth, broad, wounded surfaces, in itself, is a factor in hemostasis.

CASE 1. M. E., woman of 52 years, had typhoid fever 18 years ago, and suffers from gallstone colic for several years. No jaundice. Liver enlarged. Tumor-like resistence in the region of the gall-bladder.

Operation August 14, 1900. Incision at the lateral edge of the rectus. The dilated gall-bladder contains stones and is constricted by a carcinomatous growth near the cystic duct. The carcinoma invades the parenchyma of the liver. A small, isolated carcinomatous nodule is found on the under surface of the liver, towards the median line from the gall-bladder. No other metastases.

It is decided to extirpate the gall-bladder, together with the surrounding liver tissue, in the shape of a wedge. For preventive hemostasis two elastic clamps are applied, the tips of which come to lie close to the cystic duct. The cystic duct is cut between two artery forceps, and then the entire gall-bladder is resected with the surrounding liver tissue with a few cuts of the scissors. After ligation of the cystic artery and closure of the cystic stump by suture, a few veins have to be ligated in the angle of the excised wedge of liver tissue. Then the two wounded surfaces of the liver are united one with the other by four thick through-and-through catgut sutures (Fig. 1). Hemorrhage stops. The isolated nodule of the under surface of the liver is also cut out and the wound closed with fine catgut.

A narrow strip of iodoform-gauze is placed on the suture of the under surface of the liver and is brought out through the laparotomy wound.

Healing takes place by primary union without any disturbance. Unfortunately, the carcinoma recurred.

In difficult and old forms of cholecystitis, in which the walls of the gall-bladder present extensive destruction, and in which perforation has taken place towards the parenchyma of the liver, every operator has seen rather large trough-shaped wounds of the liver remain behind after extirpation of the gall-bladder, and has observed profuse hemorrhage from them. Here, too, I prefer suture of the liver to the cautery or packing. The gutter-like wound can easily be folded together so that its edges are in contact, while the anterior surface of the liver is raised like a ridge. One or two through-and through catgut sutures if necessary, with the addition of a few serosa sutures on the under surface of the liver, stopped the hemorrhage immediately (Fig. 2).

I wish to recommend most urgently this very simple method of providing for the bed of the gall-bladder, less on account of the prompt hemostasis than because this method prevents the formation of broad, firm adhesions of omentum, transverse colon and stomach or duodenum, with all their disagreeable consequences.

Frequently it is more simple and technically more advisable, after extirpation of the gall-bladder, in cases where there is degeneration of the liver parenchyma, to resect and make a smooth, wedge-shaped wound, which can be closed by sutures.

I have done that in the following case, in which there was found an obliterated echinococcus of the size of a walnut, located close to the gall-bladder.

CASE II. E. P., 34 years old, had gallstone colics after typhoid fever. The colics recurred repeatedly. The thickened gall-bladder was as hard as stone, and plainly palpable. At the operation the gall-bladder was found thickened considerably by inflammatory exudate, filled with stones, perforated in several places, and small concretions had penetrated the liver tissue. By the side of the gall-bladder there was an encapsulated echinococcus of the liver, without connection with the gall-bladder.

After enucleation of the echinococcus and extirpation of the gall-bladder, there remained on the under surface of the liver a wounded surface three fingers wide, ragged and bleeding

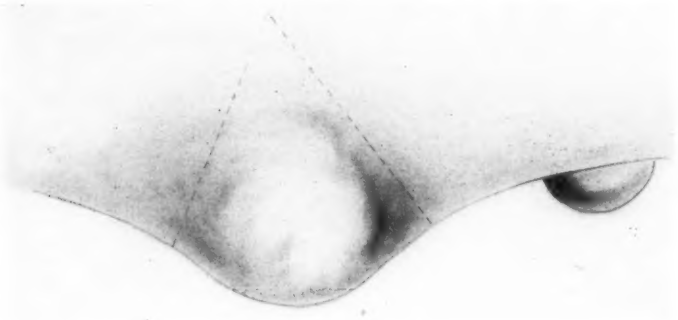

Fig. 3.

Fig. 4.

actively. The attempt to stop the hemorrhage by placing ligatures did not succeed satisfactorily. I therefore did not hesitate to resect this part of the liver in the shape of a wedge, with a few cuts of the scissors, and united it without further ligatures of vessels by through-and-through catgut sutures. The hemorrhage stopped immediately.

A narrow tampon was placed on the stump of the cystic duct. This seemed to be the more indicated, as it was in close proximity to a suture of the colon, which had been torn in separating it from the gall-bladder (former perforation?). Otherwise, the abdominal wound was closed. Healing took place by primary union without disturbance.

A similar wedge-shape resection, though with a somewhat broader base, was carried out in the extirpation of a sarcoma located on the edge of the liver,

Fig. 5.

Fig. 6.

and of the approximate size of an apple. The two edges of the wound could easily be united by a few through and through sutures.

It is a useful principle in surgery of the liver to always attempt to remove the diseased part by a wedge-shaped excision, placed at a right angle to the margin of the liver. It facilitates the closure of the wound and at the same time renders hemostasis easier and more secure.

CASE III. I. P., woman of 31 years. Has had colicky pains in the region of the liver for several months. The liver is enlarged. Two finger breadths outside the right mamillary line, there is a tumor of smooth surface of about the size of an apple, which is connected with the liver. Gall-bladder is not palpable.

At the operation the gall-bladder was found adherent, otherwise normal. It was emptied by puncture. No stones. About 4 cm. to the right and laterally from the gall-bladder there is found a tumor which is imbedded in the liver tissue, protruding on the edge. It is the size of a small apple, solid, slightly nodular, a little more firm than the liver tissue, and presents a white color in several spots. Assuming that the tumor is a primary sarcoma, it is removed by wedge-shaped resection of the liver (Fig. 3).

Two Doyen's stomach clamps are applied to the liver for prophylactic hemostasis, and the wedge is excised at a distance of one to two cm. from the tumor. About 10 fair sized vessels were caught with Péan forceps, ligated with fine silk, and then the two symmetrical wounded surfaces of the liver are united by deep, catgut sutures, of which six are passed from the anterior surface of the liver, and five from the under surface of the organ. They enter the liver at a distance from the edge, and appear beyond the middle of the wounded surface, because the ordinary needles were not sufficiently long to pass sutures through-and-through, on account of the considerable thickness of the liver. The hemorrhage entirely stopped. The peritoneum could be closed completely by suture. Recovery was complicated by a local suppuration which caused the expulsion of a catgut thread.

Histological examination of the tumor showed a spindle-cell sarcoma with remarkably extensive necroses. I do not consider it impossible that it was a gumma. Other reports given in literature concerning "sarcoma of the liver," must cause us to be very cautious with this diagnosis.

A technically much more difficult task is presented in the extirpation of an echinococcus of the liver. Several years ago I reported such an operation from Bruns' clinic (Garrè Beitr. z. klin. Chir., Vol. IV, 1889). The cyst, which was larger than a man's fist, had drawn out the margin of the liver in the shape of a pedicle. This pedicle was about one and one-half centimetres thick and eight to ten centimetres long, and could be severed after placing a number of ligatures *en masse*.

In three other cases I have extirpated large echinococcus cysts which were imbedded widely in the liver substance. We succeeded in mastering the hemorrhage even in these extensive resections, by ligation of individual vessels, and suturing of the broad-wounded surfaces after the method described.

CASE IV. M. K., girl of 12 years. Came under treatment in February, 1901, on account of echinococcus of the liver. The left lobe of the liver presented nodular enlargement and caused the abdominal walls to protrude in the median line.

In the operation (median incision), an echinococcus was found of the size of a man's fist, two thirds of which belonged to the left lobe of the liver, while one third belonged to the right lobe. Its surface was constricted slightly by the suspensory ligament. The echinococcus was completely surrounded by liver tissue, and protruded at the upper as well as the lower surface of the liver, while the margin remained free.

Through a wide incision, the animal membrane is enucleated *in toto*, and then the con-

nective tissue capsule is separated bluntly from the parenchyma, combined with a wedge-shaped resection of the edges of the liver. Considering the great extent of the enucleation in the left lobe of the liver, the hemorrhage is comparatively insignificant.

The two wounded surfaces, one belonging to the left lobe, the other only distant by the breadth of a thumb from the gall-bladder, are so unequal and the defect is so wide, that it is impossible to bring them in apposition. Each one, therefore, is sutured upon itself. Nine deep catgut sutures are needed for the right edge of the wound, four for the left (Compare Fig. 4). Hemorrhage stops completely. Abdominal incision closed completely. Healing by primary union. The temperature, which before the operation was 99.8, reached 102 on the third day. No other complication.

CASE V. C. B., woman of 36 years. Has a large echinococcus of the liver, of the size of two men's fists, and extending down to Poupart's ligament. After separation of the

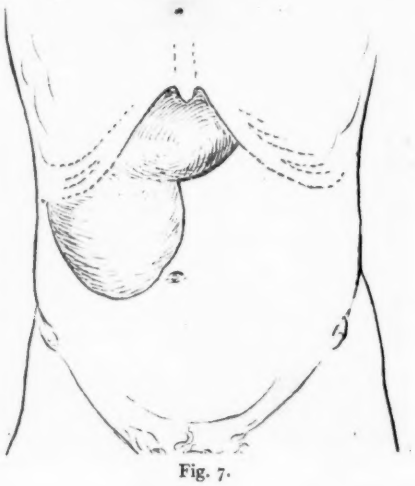

Fig. 7.

adhesions with the omentum and the hepatic flexure of the colon, the egg-shaped cyst, the point of which enters deeply into the liver, is enucleated (Fig. 5). I keep close to the line of the dense cyst membrane, in order not to enter too deeply the tissue of the liver. Some large vessels have to be caught and ligated. During the further advance, the danger lies in the possibility that the profuse hemorrhage may not be mastered by temporary packing in the narrow field of operation. Therefore the top of the tumor is cut off. In the depth of the liver wound there remains behind a shell of the connective tissue membrane of the echinococcus of the size of half a goose egg. After scraping with the sharp curette, this is sutured upon itself with continuous catgut suture, in a direction vertical to the edge of the liver. To the right and left thereof, there are seen now two wounded surfaces in the liver tissue, which are of triangular shape (5x7 cm. and 5x4 cm.). (Fig. 6). These two surfaces are sutured one upon the other, with six thick catgut sutures which penetrate deep into the tissue from above, and go through-and-through where placed near the margin of the liver. The edge of the serosa of the liver is united by additional running fine catgut suture. The hemorrhage stops completely. The abdominal incision can be closed entirely. Recovery without disturbance.

CASE VI. F. O., man of 40 years, with an enormous echinococcus, with a broad attachment to the liver (Fig. 7). The sac is larger than a man's head. It is first emptied by puncture. Then the suspensory ligament which runs obliquely across the tumor is severed, and now the adherent organs, to the right of the gall-bladder, to the left pylorus and duodenum, are dissected off with some difficulty. The top of the cyst enters the left lobe of the liver to a considerable extent, under the suspensory ligament. The enucleation of the cyst can be done only under great difficulties, and with considerable hemorrhage. The last part of the wall of the cyst had to be removed piecemeal from the liver. The entire enucleation is done bluntly, like the enucleation of a goitre cyst. Finally, hemostasis causes considerable difficulty. The left lobe of the liver has retracted high up into the hollow of the diaphragm. Compression and packing are impossible. I therefore apply the liver sutures as rapidly as possible. On the left, two deep thick catgut sutures unite the anterior edge of the wound of the liver to the posterior edge in sagittal direction. To the right, conditions are even more difficult. Here a sharp edge, which forms the posterior border of the cavity of the wound in the liver, cannot be drawn out. The bleeding and ragged adhesions are united among themselves and with the parenchyma of the liver by six catgut sutures, whereupon the hemorrhage stops. The entire length of the wounded surface of the left lobe of the liver is ten centimetres. Uninterrupted recovery without packing.

The case records given here contain, as I think, sufficient proof of the fact that extensive resections of the liver can be carried out with the most simple means. If the surgeon is careful not to stretch the vessels in cutting through the liver and not to pull them out, it is not difficult to apply hemostatic forceps and to make a ligature, while the vessels which are cut obliquely have to be taken care of by circular suture. Compression suture of the wound in the liver and catgut suture of the surface are the safest means of hemostasis. It is best to press together two wounded surfaces of the liver by suture, and therefore it is always best, whenever possible, to make the resection in the shape of a wedge placed in an approximately vertical direction to the margin of the liver.

DEPARTMENT OF TECHNIQUE

A NEW OBSTETRIC FORCEPS

By FREDERICK L. GOOD, M. D.
Former House Physician, Boston City Hospital, Gynecological Service. Former House Physician, Boston Lying-in Hospital.

After a service of six months as house physician at the Boston Lying-in Hospital, I feel that the several varieties of axis traction rods now in use are inadequate for best operating, and that better results can be obtained if certain difficulties in the application and adjustment of the rods be eliminated.

The main difficulty with the rods now in use is that in certain varieties they are not permanently attached to the blades, and that in others, although attached, it often takes much time and assistance to secure their proper adjustment.

It is admitted by many obstetricians that some presenting heads, really low in the pelvis, (the so-called intermediate heads), are best delivered by traction rods; for this reason it occurred to me that as an aid to the obstetrician, and consequently for the best interests of both mother and baby, the ideal forceps would be one with permanently attached rods which would come well down on the handles and could readily, and with no loss of time, be utilized.

Another objection to the present rods is their limited motion at the site of attachment — so limited that in some operative cases it is impossible to get the desired line of traction.

The forceps here presented, I believe, does away with the above-mentioned difficulties, and reduces the high-forceps operation to a more simple procedure.

Fig. 1 shows the traction rods already applied to the forceps, in grooves having the same axis as the handles, the left rod running down from the fenestrum, following practically the same line of direction as the blade itself, and attached at the end of the handle and posterior by a spring-lock. The right rod is attached at the fenestrum, is then carried in front of the shank, and follows the same general line of direction as the right blade — differing from the left only in its position, it being anterior instead of posterior. The spring-lock at the end of either handle, for retaining the rods in position, will be eliminated in other forceps; not because it is a bad feature, but it is not an essential one and the rods can be as well fastened by means of a pin lightly catching the handles. In order to bring the right rod down into the right handle it became necessary to cross over the lock, consequently decreasing the "depth" of the lock to a slight degree.

Fig. 2 shows the rods free from their attachment to the handles and attached to the traction handle, the blades being locked by a T-shaped clamp passed through the handles and regulated by a thumb-screw at the opposite side. This apposition clamp will in no way interfere with making changes from one method of operative delivery to the other.

After having applied and locked the forceps, one uses very little pressure on the thumb-piece of the left rod, thereby freeing it from its attachment and allowing it to drop back to be attached to the axis-traction handle. The right traction rod is then lifted from its attachment by means of its thumb-piece, is carried over the left handle and dropped back as was the left. The rods are attached at the fenestra in such a manner that one can rotate them completely, and when attached to the handle allow of traction to an angle of 90 degrees; they are so made to fit the fenestra that it is impossible for them to fall out, but they can be easily removed by the operator.

The traction handle consists of a modified Y-shaped apparatus, attached to the middle of a

Fig. 1.

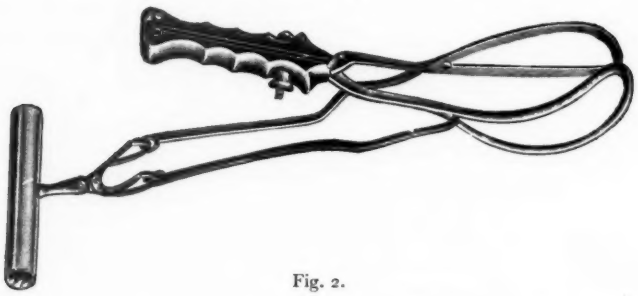

Fig. 2.

transverse bar, hook-shaped at either arm of the Y, and with a spring so attached that the rods cannot slip from the handle. The arms of the Y work on a swivel, thus assuring an equal pull on either rod. The instrument was made under my supervision, by Codman & Shurtleff, Boston.

I believe that the above-described instrument will facilitate high-forceps operations considerably, —facilitate it for the obstetrician because of its easy manipulation; facilitate it for the mother because of the lessened liability to do injury during the delivery; facilitate it for obstetrician, mother and baby because of the less time it will take to apply and utilize traction.

A SIMPLE METHOD OF REMOVING STONES FROM THE LOWER URETER

By WILLARD BARTLETT, A. M., M. D.
Prof. of Experimental Surgery, Washington University Medical Dept., St. Louis.

Four of these cases in which I have operated during the last year, have led me to develop a routine procedure which has proven simple and satisfactory. The comparatively recent introduction of the X-Ray has led to the detection of ureteral calculi in numbers hitherto unsuspected. As a matter of course the subject can then be regarded as one relatively new, and it is not to be wondered at that the various authors who have written on it should still differ as to just the best method of procedure in a given case. Some of the proposals which have contemplated removal of these concrements would make it seem a difficult if not sometimes a dangerous procedure. I am able to state, as a result of my experience, that stones of moderate size lying anywhere in the pelvic portion of the tube are very easily found and extracted, in the following manner.

1. An incision is made parallel to the external border of the rectus muscle extending from the semilunar fold of Douglas to the pubis. This goes down to the peritoneum, which is not opened but gently pushed toward the middle line, the hand of the operator keeping as close as possible to this membrane, which will drag the uretur into the wound, so intimate is the attachment between them. I never found it necessary to use a single hemostatic forceps or retractor in following the line of cleavage which leads straight to it, and in this way exposes it from the brim of the pelvis to the bladder.

2. With the tube between the thumb and first finger of the left hand it is a perfectly simple matter to follow its entire pelvic course, and thus locate a stone imbedded in it. In fact, I have accomplished this in a patient who was so fat that I could not at any time see any portion of the tube lying at the bottom of a deep wound: in general I rely very little on the sense of sight in this connection.

3. The stone is tightly held between the thumb and first finger of the left hand, the wall of the ureter, which is stretched over the same, is nicked with the point of a sharp knife, and the stone squeezed through the tiny opening which stretches to accomodate its passage. The first time this is done the operator will be astonished at the ease with which the stone finds its way out of its resting place into the grasp of the thumb and finger above mentioned,

it not being necessary to introduce the right hand or any grasping instrument into the wound. (In three of my cases it took less than ten minutes to accomplish this. In the fourth the operation was somewhat longer on account of delay in locating a very small calculus).

4. No stitches are taken in the ureter. In fact the tiny wound is never seen at all. A fine cigarette drain is carried down to the vicinity and the abdomen closed except at the lower angle.

It may surprise one who favors a more complicated method to note that the odor of urine has never been detected on the dressings of any one of my four patients, though the stones removed have varied in size from a number six shot to the smallest marble. The drain has always been removed on the fifth or sixth day, the healing has been complete a few days later, and all of the patients have been up and perfectly well within two weeks.

This method makes possible three most desirable objects, viz., the use of a small abdominal incision, since the work is performed by the aid of touch alone; a minimum of injury to the ureter, since the stone is squeezed through an opening smaller than itself; a short, simple operation, since no closure of the tiny ureteral wound is required.

THE TECHNIQUE OF DRAINING CIRCUMSCRIBED ABSCESSES OF THE PANCREAS

By GEORGE EMERSON BREWER, M. D., New York

During the past year the writer has, on two occasions, been obliged to open and drain a circumscribed collection of pus in the pancreas. In one instance the abscess was located in the head of the organ, in the other it was situated about the middle of the body, just to the left of the spinal column.

It will be readily appreciated that the situation of these lesions precluded the possibility of extraperitoneal drainage through the flank, and the problem was, therefore, how best to drain these deep-seated collections of pus through the uninfected peritoneal cavity.

The following method was employed: A median incision, about 10 cm. in length, was made through the left rectus muscle, and the abdomen opened. The transverse colon with its mesentery was turned upward, and the body of the pancreas palpated through the transverse mesocolon.

As soon as the indurated area was appreciated, the intestines were walled-off by gauze-pads, and an exploring needle plunged through the inferior layer of the mesocolon into the centre of the mass. A syringeful of creamy pus was withdrawn, and the needle-opening cautiously enlarged by introducing a closed pair of thin-bladed dressing forceps and withdrawing them partly opened. About two ounces of pus were evacuated and the cavity syringed out with peroxide of hydrogen. A long, rubber drainage tube, 15 cm. in diameter, was then introduced into the small opening and tightly packed about with a thin strip of folded gauze-tape, to prevent leakage of the pus along the side of the tube. The tube and gauze-packing were then secured in place by a single stitch of plain catgut. The distal extremity of the gauze-tape and the long drainage tube were then brought out, at the lower angle of the wound, leaving ample space for the transverse colon and small intestines to fall into their accustomed places, and form adhesions around the 25 or 30 cm. of the drainage tube, which passed from the abscess to the lower angle of the cutaneous wound. After cleansing the contaminated area of peritoneum, the external wound was tightly closed around the tube and tape by layer suture, and a sterile dressing applied.

Practically no reaction followed the operation. The drainage was free for the first 48 hours, after which it diminished rapidly in amount. The tube and tape were allowed to remain in place for eight days, when they were easily withdrawn. The abdominal wound closed rapidly, and the patient made an uninterrupted recovery.

In the second case, the technique was exactly the same, excepting that the pancreas was exposed by division of the gastro-colic omentum, and the tube was much shorter and passed directly from the abscess cavity to the external wound; while in the first case it described a gradual curve to allow the transverse colon to fall into place. The recovery in this second case was also prompt and uneventful.

EMPYEMA

By A. T. MANN, M. D., Minneapolis, Minn.
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The surgery of empyema has been disappointing. The results have been poor, both in regard to the time required for recovery and in regard to the crippling of the lung and deformity of the chest which is sometimes extreme. It is in the hope that some points might be developed to better the situation that this paper was undertaken. At least three objects of attack present themselves, namely, the early diagnosis, the expansion of the lung, and the treatment of the chest-wall.

The early diagnosis of empyema is of great importance, because with proper treatment, it is the rule that early cases end in complete recovery, with surprisingly little deformity. It is no more credit for us to bring a case for operation with a chest half full of pus, than it is to wait with a case of appendicitis and finally bring it in to the operating room with the abdomen half full of pus. Inflammation of the pleura is usually, like inflammation of the peritoneum, a local disease at first, and like peritonitis, empyema is as a rule secondary to some other focus of infection.

In children, a beginning empyema is often missed because of the failure to diagnose a preceding pneumonia. In children, and in older patients, the early diagnosis is missed because of the absence of close observation and careful search on the part of the clinician. A close study of the case, combined with percussion and auscultation, will demonstrate the presence of fluid, but will not always indicate its character. A leucocyte count may point the way, but, as a rule, aspiration or exploratory incision must settle this for us.

When the fluid is free and accessible, exploratory puncture offers little difficulty, provided the trocar used is large enough to carry thick viscid pus.

When the fluid is encysted probably the best symptom of its presence is localized tenderness, elicited in a careful search along the fissures and the margins of the lung, sometimes developed only on deep pressure. The X-ray is sometimes an aid to diagnosis. Exploratory puncture is often negative because of failure in gauging the depth or the exact direction of the pus collection. An exploratory incision may often be advised when such pus collection is suspected in case of a dry puncture, or even without resorting to the preliminary puncture, which certainly is not devoid of danger.

When one considers the changes resulting from an empyema, the retraction and crippling of the lung, and collapse of the ribs and scoliosis, and remembers that these are all in proportion to the duration of the disease, the necessity for early intervention and for restoring at the earliest possible date the functional activity of the chest and its contents, is self-evident.

The surgical treatment of empyema has two distinct objects: First, the primary operation for the relief of pus, and the early expansion of the lung; and, second, the secondary operations to repair the unsatisfactory results of the primary operations.

In the primary operation, in encysted empyema, the incision should be directly over the collection of pus; in general empyema, it should be in the part last reached by the expanding lung, which is about at the mid-axillary line in the lower part of the chest. The point is not necessarily at the very bottom of the cavity on account of the high arch of the diaphragm (see Fig. 1). It is the rule to excise a rib, though there is a growing tendency on the part of a few surgeons to trust to an incision between the ribs; at least there must be good space for tube drainage for from four to six weeks. And the opening should be large enough for the introduction of a finger to loosen masses of clotted fibrin, when present, so that they may be removed, and to note the degree of expansion of the lung and the presence of adhesions. If there are adhesions so placed as to interfere with the expansion of the lung they may be broken up, otherwise they are of some aid in the healing process.

Tube drainage is practically universal, although Brinkman, four years ago, reported a method for permanent drainage without tubes, whereby he sutures the cut edges of the pleura to the skin, but the edges sometimes have to be refreshened later before they will heal. Various methods have been employed in the use of tubes, to prevent the edge of the expanding lung from impinging upon the cut end of the tubes, a condition which causes considerable irritation and distress as well as a tendency to stop the drainage. This may be accomplished by making the tubes short so that they will not project into the cavity beyond the pleural surface, or by making them a little long so that the base of the lung may come down about the smooth sides of the tubes, which may then be somewhat shortened, and when adhesions have formed, may be removed, because there will be left behind a smooth channel for drainage downward over the diaphragm to the external opening. Another method spoken

of in the textbooks (Tyson) is to string a long tube in at the opening already spoken of, then up through the chest cavity, and out through a second incision near the top of the pus cavity. Dr. C. H. Mayo does this with a spirally split tube through the lumen of which is drawn a wick of gauze. The objection might be raised that the chest-wall is not straight but rounded, and that the tube must stand out into the cavity like the string to a bow, so that before the tube is flattened against the pleural surface and the lung adherent about it, as is desired before its removal, it must have been pushed outward by the expanding lung, a thing which might delay the expansion somewhat.

Irrigation of the pus cavity is not practised by the American surgeon, as a rule, except sometimes in cases of putrid empyema. Experience has shown that it delays healing when it causes no complications, and cases of death have resulted from simple irrigation of the cavity.

In regard to the aspiration of empyemas one is lead to the following conclusions:

1. Aspiration may be used for diagnostic purposes but repeated aspiration as a means of treatment is time worse than wasted.

2. In large empyemas it may be used as a preliminary step a short time before operation to relieve the pressure on the lungs, heart, and blood-vessels, and so lessen the shock of the operation.

3. In double empyemas, after operation on one side, aspiration may be used on the second side as a preliminary step to a later operation, though the double operation has been successfully performed at one sitting.

4. It should be used as a palliative measure in empyema before the resolution of a pneumonia.

5. It may sometimes be used as a palliative treatment in cases with advanced tuberculosis, though most cases with accompanying tuberculosis improve, and many are cured by drainage.

6. A tentative aspiration is called for often in the pleurisies of children on account of the frequency and the obscurity of their empyemas; however, aspiration should not be used as a method of treatment even in the pneumococcus pneumonias of children, because, though some of them recover under this treatment, most of them do not. Practically all of them recover if properly drained before they are exhausted. The same statement is probably true of the more rare condition of typhoid empyema in the adult.

In regard to the treatment by vaccins produced by cultures of the special organisms present, with a view to increasing the resisting power of the patient in accordance with the theory of opsonins worked out by Professor A. E. Wright, of England, and which has given such brilliant results in some septic conditions, all that can be said is that it has been tried with some success in a few cases of empyema, and that it is deserving of a thorough trial, but unless it develops some very unexpected results it would not preclude the operative drainage of the empyema.

With the operation for the relief of pus comes the question of the expansion of the lung. Unless bound down by adhesions or covered by a sheet of connective-tissue the lung will practically always expand under proper conditions. Relief from pressure comes when a free exit for the pus has been provided, but it does not follow that the lung has independent powers of expansion beyond a limited degree. Positive pressure inside the lung or negative pressure in the thorax outside of the lung, are the two means we have of gaining our object. Positive pressure inside the lung, such as can be attained by blowing water from one bottle to another through a series of Woulffe bottles, by blowing into a rubber bag, by forced coughing, by singing or by blowing on a wind instrument such as a cornet — such pressure is helpful, but the process is exhausting, and we cannot count much on such aid until convalescence is well advanced and the patient has gained a considerable degree of strength. Some means of producing negative pressure within the thorax is the thing which aids expansion of the lung the most, and it is the thing which is most neglected by the general surgeon. In 1890 Schede showed us that a common dressing can be made to act in a valvular way if made large and put on tight. He covered the opening with a thin layer of oiled silk, but that is not necessary, as the inner layers of a dressing soon become soaked and make an air-tight valve with the chest-wall. This allows air to escape from the pleural cavity, but not to enter it. On expiration or a cough, there is a tendency to force air from the well side into the other bronchus, the lung expands a little, and some air or pus is pushed out of the chest cavity. The capillarity of the dressing tends to drain the pus gradually from the chest. For both of these reasons there is a tendency to establish a negative pressure and to expand the lung. In simple cases of empyema where surgical intervention has been employed early, before the lung has lost any of its power to expand on account of adhesions or other reasons, the above line of treatment can be expected to lead to a complete cure in a few weeks, with little or no deformity of the chest.

Various other means have been devised to accomplish the same ends, but without material advantage. A number of special forms of drainage tubes with some valvular device have been made, but

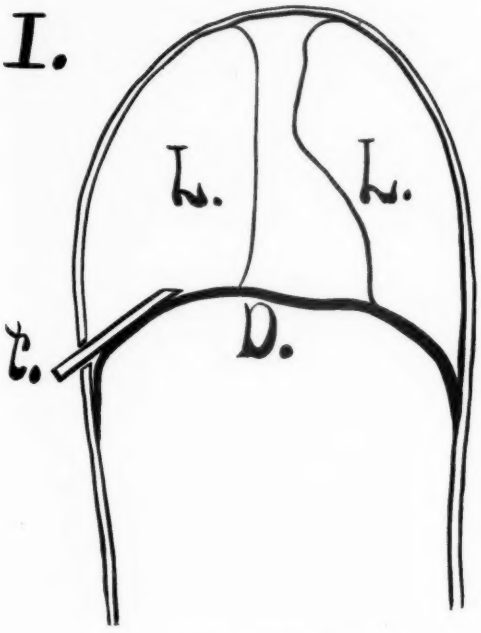

Fig. 1. Showing curve of diaphragm.

they either fail in their purpose, or they require too much attention to make them deserving of serious consideration.

In cases of empyema which are not so simple, but in which the lung has been compressed so long that it is bound down by adhesions, or in which expansion does not take place readily under the tight dressing, some other means is necessary to compel the expansion of the lung and bring it into contact with the chest-wall. This suggests an active suction. Buelau seems to have been the first to put the idea into use, by recommending continuous syphonage through a fairly long tube ending below the surface of a bichloride-of-mercury solution in a bottle beneath the bed. The weight of the column of pus within the tube, pulling on the chest contents, caused the negative pressure. This apparatus, however, was defective. The tube introduced through the the canula of a large trocar soon became loose and failed to be air-tight. Other men modified the method in various ways, but they were all unsatisfactory until Perthes, in 1895, introduced the use of the well-known Bunsen's air-pump, a simple form of which is represented (Fig. 2). The principle of this is that water falling through a tube will cause suction from any reservoir connected with it by a tube inserted into it in a downward direction. Striking results are obtained by this method. (See Fig. 3). Lungs which by the old methods expand slowly will expand more rapidly, and many cases have yielded in which previously it was necessary to perform extensive destructive operations on the chest-wall to bring it into contact with a shrunken lung. Perthes attached a manometer tube to register the negative pressure, but that is an unnecessary complication, as the patient can readily tell when the suction is too strong for him. All that is needed is a simple Bunsen pump, such as can be obtained at a chemical supply house, or which can be extemporized by fusing one short glass tube into the side of another, and piecing out with rubber tubing, or a tinsmith can solder two

Fig. 2. A simple Bunsen pump exhausting air from receiver.

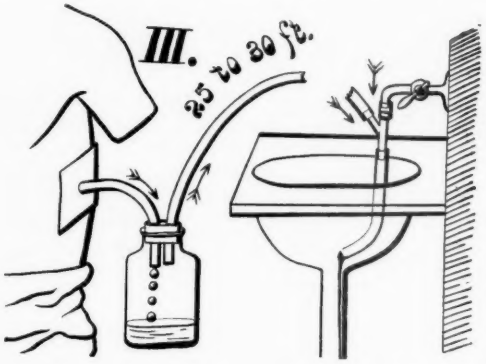

Fig. 3. A simple Bunsen pump exhausting air and pus from the chest cavity of a patient and causing consequent expansion of the lung.

The pus is collected in an air-tight bottle interposed between the patient and the pump.

metal tubes together to answer the purpose. The upper end may be attached to any faucet where there is running water, the lower end directed into the drain, and the arm on the side connected by rubber tubing and an air-tight dressing with the chest cavity of the patient, who may be in bed 25 or 30 feet away. The stream of water to be turned on will be found to be surprisingly small, as it requires only a negative pressure of 10 mm. of mercury to keep a normal lung expanded, and two or three times this amount is usually sufficient for the expansion of the lung in cases of empyema, though occasionally in obstinate cases from 50 to 150 mm. have finally been used. This simply requires a little longer waste-tube and a little faster jet of water. A dentist's saliva extractor has been suggested by Cheesman as a form of the Bunsen pump which can be used.

The air-tight dressing may be made as given by Perthes, by fastening a rubber dam to a tube passing through its center, or, as suggested by Cheesman, to the flange of two rubber stems of a bicycle (better an automobile) air-valve, cemented base to base and used as the tube. The contact with the chest may be made air-tight by a thick ointment, such as the zinc oxide ointment suggested by Van Hook. This apparatus has yielded some brilliant results. It has in many cases materially shortened the time of the complete expansion of the lung and the healing of the condition.

We now come to methods for the repair of unsatisfactory results of primary operations which have been too long delayed and have left a cavity often persisting for years after drainage, with the lung still collapsed, and bound down by adhesions and by a more or less thick covering of tough fibrous tissue which also has developed over the diaphragm and chest-wall. In this condition we have a cavity which will never heal except when it is small unless some operative means are used to bring the chest-wall and the lung surface into contact. Until of late years the methods have all aimed at mobilizing the chest-wall over the unfilled cavity, in order to allow it to fall into contact with the lung. Gustav Simon, it seems, was the first to suggest multiple rib resection. This procedure was extended by Küster and afterwards by Estlander, whose name it bears. His procedure is to resect the ribs subperiostially over the entire cavity, resecting too many rather than too few, in order to have the chest-wall lie in contact with the lung throughout. The Estlander operation often has to be repeated from once to several times before the final success. It remained for Schede to point out that the difficulty lies in the thickened pleura which unites with its fellow with great reluctance and impedes the healing. So he removed the pleura and the intercostal tissues, as well as the ribs. The operation as generally performed means an incision from about the fourth rib in front down to the tenth, across in a curve to the back, and up to the median line of the scapula. The skin, scapula, and subscapularis are dissected up, and the ribs, intercostal tissues, and pleura, sometimes as high as the second rib and down to the bottom of the pleural cavity, are removed from the sternum to the transverse processes of the vertebræ. This is a wicked-looking operation involving considerable shock to a patient already weakened by prolonged suppuration, and the hemorrhage may be very severe, and is considerable even when carefully controlled. This operation causes marked deformity of the chest, as well as great weakening. There is sometimes much difficulty in filling in the apex of the cavity beneath the upper ribs. In one case in which this had failed to fill in after a Schede, the writer covered the surface with skin-grafts, and brought the skin-flap across, below it, continuous with the skin-grafts running up on the posterior wall of this dome-shaped space. So far as could be seen all the skin-grafts lived. Some operators have gone so far as to resect the clavicle, and remove even the first rib. Certainly nothing more can be done by working on the chest-wall to solve the problem of obliterating the space and bringing the wall into contact with the lung surface. If anything more is accomplished it must be done by working on the lung side.

In 1893 Fowler demonstrated that the lung, bound down by adhesions and covered with a

tough fibrous layer, still had the ability to expand if the adhesions were loosened, and still more if the fibrous covering were removed. Le Lorme, in France, a little later in the next year, demonstrated the same fact independently.

It would seem that our problem was solved in this operation of decortication of the lung, but it is not so. The reports of many operators, who have attempted this operation since 1893, show that in many cases it is impossible to do an extensive decortication of the lung, either because of excessive hemorrhage, the great length of time required and its attendant shock, or the actual inability to separate the thickened covering without extensive laceration of the lung.

It remained for Ransohoff of Cincinnati to publish, last year, what seems to me to be the key to the problem. From one of the first cases in which he attempted the Fowler operation, he states: "I learned what other operators must certainly have observed, namely, that an incision carried through the thickened pleura until the lung tissue is reached, as is evidenced by the bluish tint in the floor of the cut, widens out rapidly and in full view more with each respiration until the cut becomes a groove . . . . so will a second and a third, and any number that may be made . . . . The special feature of the procedure consists of . . . . many parallel incisions removed from each other about a quarter of an inch and of crossing these obliquely or at right angles with other parallel cuts. Little islands of thickened pleura are thus left on the surface of the expanding lung." In addition, the adhesions between the margins of the lung and the chest-wall are carefully separated.

In reviewing the cases reported it has seemed to me that the operators should take one more step forward and not only erase the parietal pleura and make the multiple incisions in the thickened pleura of the lung, but should so arrange the operation that we may, early in the convalescence, make use of the water-pump, which has proven such a successful means for the expansion of the lung after primary operation in cases of recent empyema, as suggested by Perthes. This would mean a trap-door operation without the removal of the ribs in many of these cases, and the early application of some form of the Bunsen pump.

BILIARY OBSTRUCTION FROM CALCULI IN THE COMMON DUCT

By HENRY O. MARCY, A. M., M. D., LL. D., Boston, Mass.

FORTUNATELY complete obstruction of the biliary outflow through the common duct is rare, and operative measures for this most distressing and dangerous condition is of sufficient importance to put on record. The first case was reported, in one of a series of operations for biliary obstruction, to the Surgical Section of the American Medical Association in May, 1890, published in the journal of the association, December 20, 1890. Since, it now appears to have been the first case where a calculus was removed from the common duct. Since the subsequent history is interesting, I quote briefly from our hospital records.

Mrs. P., aged 40, admitted to hospital the latter part of October, 1889, with the following history: A widow, never pregnant, short, stout, thick abdominal walls; has had several severe attacks of biliary colic during the last year. Is deeply jaundiced, from which she has not been entirely free. The last severe attack occurred in August, at which time she was placed for a period upon the danger list; since then, has been a continuous sufferer. At admission there was severe local pain, vomiting, marked jaundice, urine a very dark color from bile, stools clay-colored. A small, painful, well-defined, slightly fluctuating tumor can be outlined in the region of the gall-bladder.

Operation. October 26, 1889, assisted by Drs. A. P. Clark and Samuel Nelson of Cambridge. The gall-bladder was easily defined, and was carefully sutured to the peritoneum before opening. Following incision, 10 ounces of thin, light-colored bile escaped; floating out with it, was a single calculus the size of a large almond. Careful probing revealed the presence of another stone in the common duct. All effort at dislodgment failed and as much force as was deemed justifiable was used to crush it, but without avail. The gall-bladder was carefully disinfected; the stitches uniting it to the peritoneum were cut away; protective packing was carefully applied; and repeated efforts were made to dislodge the calculus. These were entirely unavailing, although between the fingers the duct was grasped and as much force as seemed safe was applied in an effort to dislodge it.

There was no question with any of us but that the stone was firmly imbedded about midway in the common duct. It was too hard to permit of crushing it without endangering the integrity of the tissues.

We now enlarged the abdominal wound in order to obtain free access to the parts; made traction upon the enlarged gall bladder; and with scissors divided the walls of the bladder and duct, and everted its edges from over the roughened calculus, which was even then removed with difficulty. The thickened mucous membrane of the duct and gall-bladder was united by a fine continuous tendon suture, and in like manner the peritoneal edges were carefully coapted, while over all a third layer of suturing with tendon, a continuous seroserous stitch intrafolded the edges of the entire wound of the viscus, measuring when the suturing was completed about four inches. The abdominal wound was closed without drainage by buried animal sutures, in the usual manner, and sealed with iodoform collidion. Free vomiting of a large amount of bile followed the recovery from ether. Rapid convalescence ensued without incident and the patient remains vigorous and active. The rough, mulberry-looking calculus weighed, when dried, 15 grains.

This patient was kept under observation by me for a considerable period, although her health and vigor seemed fully restored. In 1905 she again consulted me for localized pains and slight jaundice, but was not seriously ill. With intermissions, the attacks became more severe. She was admitted to hospital a second time June 1, 1906. At this time she was seriously ill with elevation of temperature, rapid pulse, and marked jaundice. From the 9th to the 18th was decidedly on the danger list; became somewhat better, but on the 25th all her symptoms were more marked, yet it was deemed ill-advised to operate. Seemingly without hope from other relief, I operated upon her on July 17th, assisted by the late Dr. E. D. Ferguson of Troy. The gall-bladder was obliterated; almost entirely reduced to a firm membranous band. A careful examination of the base of the liver and bile ducts gave no evidence of stone. There was, however, a broad band of adventitious connective-tissue which compressed the biliary ducts. This extended quite to the intestine. We made a free division of these structures. There was no trouble from hemorrhage. I applied a gauze drain between the separated edges of the structures, closing, in large part, the abdominal wound. Patient bore the operation well, making a slow convalescence. Seen February 1, 1907, urine clear, no jaundice, no tenderness at the site of the wound, general nutrition fair, weight nearly normal, but less vigorous than formerly.

CASE 2. Mr. D. of New York, patient of Dr. E. Didama, of Cortland, N. Y., aged 63. An active business man, weighing over 200 pounds, always well until 3 years ago. Then a very acute, severe attack of biliary colic; since which time not well. There have been 3 subsequent equally severe attacks. Several of the leading New York physicians have concurred in the opinion that the patient is suffering from a small gall-stone acting like a ball-valve, at times shutting off the biliary outflow. Entered the hospital June 11, 1903. With much difficulty the base of the liver was brought into view and a very small, shrunken gall-bladder, everywhere buried in old vascular adhesions, was dissected free from its bed, quite to the entrance into the common duct. The gall-bladder contained only a very little glary mucus scarcely tinged with bile. From the common duct I removed a mulberry rough calculus scarcely larger than a large pea. Through this opening I introduced a probe upward and backward into the hepatic duct; and downward and inward a small elastic steel probe catheter was easily carried into the intestine. The verification of its patency was confirmed by injecting water through it. This left a nearly straight canal consisting in the upper part of the greatly enlarged hepatic duct and below of a very much smaller common duct. Through this opening the calculus had been easily removed. There did not appear to be tissue sufficient with which to close this opening by sutures and therefore a double drainage tube was carefully placed at its side and packed around with pieces of iodoform-gauze. There was comparatively little hemorrhage. The shock was not severe, the convalescence was rapid and the patient remains in excellent health.

CASE 3. During the early summer of 1906, I assisted my late friend, Dr. E. D. Ferguson, of Troy, in the removal of a gall-stone from the common duct. Some weeks earlier Dr. Ferguson had removed rather a large calculus from the gall-bladder and although at the time it was in evidence that there was a deeper obstruction, the extreme condition of the patient prevented further operative interference. There had been a free flow of bile from the fistulous opening and the present operation was undertaken to remove, if possible, the cause of obstruction. A free dissection permitted the base of the liver to be brought into view and after much difficulty a small stone was felt in the common duct. An incision was made over it through the duct and an oblong smooth calculus was removed. This fitted firmly into the duct. It was not possible to suture the

opening and the wound was drained as in Case 2. The patient was in a very unsatisfactory condition, having been long ill, all the structures being jaundiced. However, he made a slow but satisfactory convalescence.

Two very recent cases are of sufficient value to add to the series.

Miss G., aged 50, from whom about 8 years ago I removed a large uterine myoma, became very ill in the early autumn of 1906, with biliary colic. The attacks were acute and very severe, but not of very long duration. Only after the fourth, was she willing to submit to surgical interference. The gall-bladder was moderately filled with bile and not very much changed in structure. A rough mulberry calculus about the size of a large pea was found firmly wedged in the outer part of the common duct. With some difficulty, pressure from below upward was sufficient to crowd it through the dilated cystic duct and thus let it be removed through the opening made into the gall-bladder. There was only one other calculus, size of a small shot, which was in the gall-bladder. Drainage by a rubber tube, the edges of the gall-bladder being inverted about it and held by a suture. Convalescence was easy and rapid and the patient was discharged.

Mrs. L., aged 66, rather stout, general health good until within the last 3 or 4 years. During this period had repeated attacks of biliary colic. About a year ago was admitted to hospital for operation. Suffering suddenly ceased and within a day or two, 80 calculi were washed from the dejecta. These stones were nearly uniform, about the size of large BB. shot. Complete relief followed. During the early winter of 1907, there were two or three severe attacks followed by jaundice, etc. Last occurred April 10, 1907. Was admitted to hospital and operation, April 13.

A small contracted gall-bladder was filled with a teaspoonful or more of nearly uniform-sized calculi resembling those passed the year before. Deep in the common duct could be felt a single and much larger calculus firmly imbedded. There were many old vascular adhesions, which with some difficulty were dissected away and removed from the gall-bladder. The ducts were fully exposed, but it was found impossible to dislodge the calculus. An incision was made over it and it was removed. It was irregular, about the size of a large pea. Through the opening it was perfectly easy to pass a probe upwards into the biliary duct and downward into the intestine. Bile flowed freely through the opening. It did not seem feasible to suture the duct. A small rubber drainage tube was introduced into it and packed about with iodoform-gauze. There was rather more than the usual amount of hemorrhage — chiefly venous. Patient rallied well from the ether. An abundance of bile was found in the stool on second day. Number of stones removed 149. There was only a stain of bile in the gall-bladder, which was so filled with the impacted stones as to shut off any biliary flow through the cystic duct.

Modern surgery has scored one of its most brilliant triumphs in the operative field of the right upper quadrant of the abdomen. The five illustrative cases here given have been selected as typical of one of the gravest problems solved by the surgeon.

SOME OF THE FACTORS THAT INFLUENCE MORTALITY IN OPERATIVE SURGERY[1]

By J. D. SINGLEY, A. M., M. D.

Surgeon to the Pittsburgh Hospital; Associate Professor of Surgery and Clinical Surgery, Western University of Pennsylvania; Director of Magee Pathological Institute, Mercy Hospital, Pittsburgh, Pennsylvania

It is a truism that attention to detail is a prerequisite of success, nowhere more applicable than in the field of operative surgery and nowhere more surely shown than in a year's mortality table. It is my purpose to consider some of the so-called minor details connected with operative work, but which actually are of the utmost importance.

In many clinics it is common to hear the operator say, just before operation, with an air of conscious superiority, "the next case, my house surgeon tells me, is one of (say) tubercular glands of the neck. I have not seen the patient!" An operation based upon this diagnosis is promptly begun. Even if the diagnosis prove correct, this is not giving the patient the benefit of the operator's experience and ripe judgment. Some other pathology may exist of far more serious import and capable of causing death when added to the effect of the operation itself, or the unsuspected disease may be of such gravity as to itself terminate life in a short time. The operation has been wholly unnecessary. Without a careful study of the history of the patient and of the patient himself, it is impossible to form an intelligent idea of the resistance of a particular individual. Resistance varies greatly even in those who are in apparent health. Before advising operation one should estimate as accurately as possible the danger to be incurred from operation, and compare it with the risk to life if no operation is done.

The successful surgeon is he who is best able to select the proper case for operation; and having done so, chooses a time for operation that will give his patient not only the best chance for an operative recovery, but also the best chance for an ultimate recovery.

If an operation has been decided upon, and the condition of the patient can be improved, this should be done. Prolonged rest in bed, however, except when required to favor the walling off of acute infectious processes, and to diminish the virulence of infecting bacteria, is undesirable. The functions of the body, especially of those organs that have to do with excretion, are but poorly performed with the organism at rest. In addition, the prospect of an operation in an individual accustomed to lead an active life has a depressing mental effect when he finds himself with nothing to occupy his mind but his ills and the dread of the coming ordeal. The effect of mental depression and fear in favoring shock at operation is attested by many surgeons of large experience.

In patients showing evidence of little resistance, the use of salt-solution by mouth and by rectum, with bandaging of the extremities prior to operation, are measures of distinct value in preventing shock.

In the past much harm has been done by severe purging as a part of the preliminary operative treatment. The body is drained of fluids which are of great value not only during operation but following it. In operations not involving the abdominal cavity a single free bowel movement stimulated by some agent that will induce an evacuation approaching normal, conserves the strength of the patient and diminishes the liability of shock. In abdominal cases, it is desirable to have the alimentary canal more thoroughly emptied, but here too severe purging should be avoided. One to two ounces of castor oil on the eve of operation with an high enema an hour before the anesthesia will empty the canal sufficiently.

As to the time for operation: Studies of immunity, experimental and otherwise, and the careful observation of the clinical course of cases, afford ample justification for our views on the proper surgical treatment of acute inflammatory infectious processes. That the body develops immunity to a greater or less degree in acute infections has long been recognized. The organism promptly sets about to resist bacterial invasion provided the dose of the infecting agent is not overwhelming. The various methods of Nature's attempts at defense are not by any means well understood as yet. Elevation of temperature, leucocytosis, the development of opsonins with phagocytosis, and congestion, are probably efforts in this direction. A most striking example of visible conservative effort is shown in the effectual localization of intra-abdominal pyogenic infections such as occur about the appendix. If given an opportunity, Nature can and does wall off these

[1] Read before the Pittsburgh Academy of Medicine, April 30, 1907

areas of infection with plastic exudates, gluing together the adjacent peritoneal surfaces; and it is much more effectively done than we are able to do it with gauze pads at the operation. The slow gradual absorption by the lymphatic system of the infectious material, while certainly deleterious, is received in such small doses that nature is able to cope with it.

Clinical experience has taught us to avoid operation if possible during the height of an infective process — in abdominal inflammations especially. If we interfere during this period we open up venous and lymphatic channels and permit a sudden influx of intensely virulent bacteria or their toxins to overwhelm the patient with serious or even fatal results. The safe time to operate, then, in these conditions, is either during the first few hours before the process has gained much headway, or better, after the acute symptoms have subsided. Rest for the patient and rest for the part involved, with all that this implies, are the important factors which aid Nature in tiding the patient over the acute period.

Not infrequently the temptation to resort to immediate operation in traumatic cases is great, while the best interests of the patient demand that this be postponed until they have fully reacted, or have even had a night's rest and an empty stomach. This is especially true in the case of the laborers who come into our hospitals with injuries demanding operation with an anesthetic, say amputation. They are vigorous, muscular subjects, addicted to the use of alcohol, and have full stomachs as a rule. As a result they take a large quantity of ether with a very violent and prolonged stage of excitement, are cyanotic from excessive mucus and vomit quantities of partially digested food when the ether is withdrawn. These are ideal conditions for the development of aspiration pneumonia, nephritis, pulmonary embolism, and fat embolism, and I have lost cases from these causes who should not have died, as far as their injuries were concerned. If hemorrhage is controlled, the wound disinfected, and a moist antiseptic dressing applied, no harm can result from delay. On the other hand, a rest of from 12 to 24 hours will put the patient in a much better condition for operation. In certain cases such as depressed fracture of the skull and penetrating wounds of the abdomen, immediate operation is of course demanded.

Operations should be done in the morning before any other work except in cases of emergency. The patient as well as the operator has usually had a night's rest — and refreshing sleep is a powerful tonic for both. The surgeon, more vigorous and alert than at any other time, does his best work then. A tired and exhausted worker is not a careful one.

Individual capacity for work varies greatly. This should be carefully estimated by every surgeon that he may avoid undertaking too many operations at a given time. There are a few, but not many, operators who can perform the sixth or seventh operation in a series with the same skill and celerity that they did the first or the second.

The importance of speed in operating cannot be too strongly emphasized and is at present receiving the attention it deserves in many quarters. This is in marked contrast to the state of affairs 8 or 10 years ago. The shorter the operation, the less ether, the less shock, the better prognosis. Every operator has observed that his cases that leave the table with a pulse of 80 or 90 run a less complicated course toward recovery than do those with a pulse of 120, no matter how quickly the latter recover from shock. Careful, precise work, however, with speed is essential. A single imperfect stitch in intestinal work is a more vital mistake than the prolongation of the operation 10 or 15 minutes.

The temperature of the operating-room deserves attention — and it has received attention, usually with the result of having it too warm. An operator does not do his best work when physically uncomfortable, relaxed, and perspiring. His personal discomfort obtrudes itself upon his attention from time to time whether he will or not, and takes it from the work in hand. It has usually been considered necessary to have the room from 80° to 90° F. that the patient may not be chilled. If, however, the patient is on a warmed table, or surrounded with hot-water bottles, if he is properly covered, and if we see to it that he does not lie upon wet sheets or blankets the result of the careless sloppy use of liquids in cleansing, he will not be chilled if the temperature of the room is from 72° to 74° F. The patient is not accustomed to live in a temperature of 80° to 90° F. Such a temperature induces loss of vasomotor tone in itself at a time when there is a marked tendency in this direction from shock. In intestinal cases requiring eventration in which high temperature has been considered essential, no one thinks of relying upon the room temperature to keep the exposed parts at a proper degree of heat. The exposed viscera are wrapped in hot moist towels or gauze.

The anesthetic and the method of administration are equal in importance to the operation itself and are often of greater importance. One recalls with horror the methods in vogue in years past

with their high post-operative mortality from pneumonia, nephritis and other pathology not well understood. The consensus of opinion to-day is that ether is the safest general anesthetic that we have. In my own work I use ether by the open drop method, local anesthesia or nothing — never chloroform. The latter possesses no advantages over ether properly given, and is more dangerous. A half hour before the anesthetic a hypodermic of morphine sulphate gr. $\frac{1}{6}$ to gr. $\frac{1}{4}$ with atropine sulphate gr. 1/100 to gr. 1/150 is given. This reduces the amount of ether required, almost does away with the stage of excitement, and so reduces the amount of mucous secretion that it ceases to be an annoyance. The administration of ether is started on the operating table at the same time that the preparation of the field of operation is begun. By the time the preparation is completed the patient is anesthetized, five or six minutes being the usual time required. The ether is given drop by drop, continuously, the frequency and size of the drop being modified according to the depth of anesthesia needed. An Ochsner inhaler is preferred covered with four to six layers of gauze. Between the layers is placed a piece of oiled muslin with a hole cut in it the size of a silver dollar, the center of the opening falling over the center of the upper lip. The ether is dropped on the gauze in the center of the opening — and at no other place. The smallest possible amount of ether is used. Contrary to the usual idea I believe that the anesthetizer *should watch the operation* as well as the patient; and he should be familiar with the various steps of the operation in order that he may anticipate painful manipulations with deep anesthesia, and use light anesthesia for such procedures as are not painful. In a series of cases of all sorts anesthetized for me by Dr. H. B. Patterson the amount of ether averaged between four and four and one-half ounces. To have the patient regain consciousness upon the operating table while the dressings are being applied is desirable. It is an evidence of a skillfully given anesthetic — that too much has not been given. Dr. Patterson has called my attention to the influence of the Trendelenburg posture during operation in increasing the amount of ether required. Even a slight elevation has an effect. This position has been used much more than it should be to the detriment of the patient and can well be dispensed with in a great many operations in which it is used. That it favors hypostatic congestion of the lungs cannot be doubted.

Since September, 1902, I have advocated and practised gastric lavage immediately upon ceasing to administer ether. A quantity of ether-laden mucus is thus removed from the stomach which, if left, either produces nausea and vomiting or is absorbed and eliminated by the kidneys. A series of cases in which it was used did not show a single instance of post-operative vomiting.

The details of post-operative treatment are probably neglected more than any other part of an operative procedure. The posture of the patient after operation has a distinct influence upon the progress of affairs within the abdomen. Elevation of the trunk or of the head of the bed drains fluids into the lower abdomen which is the most tolerant portion of the cavity. It should be instituted in all abdominal cases not suffering from shock, or if shocked, as soon as reaction takes place. This position too has a decided influence in preventing hypostatic congestion of the lungs, especially in the old and feeble. In gall-bladder and appendix cases the head of the bed should be elevated rather than the trunk, and the body tilted toward the affected side by pillows. The patient must be kept quiet and morphine, though rarely *ever* necessary, will do less harm than restlessness.

High enemata of warm normal salt-solution given *very slowly* are of the greatest value. They relieve thirst, favor elimination by the kidneys, diminish the effect upon the kidneys of toxic products including ether by dilution, and stimulate absorption from the peritoneal cavity.

In abdominal cases, ice bags lightly filled and placed upon the abdomen relieve pain, and appear to have some influence in combating inflammation.

Strychnine sulphate gr. 1/30 hypodermically, is given every four hours as a stimulant until the stomach is retentive, when it is given by mouth.

The stomach is washed out if there is acute dilatation of the stomach or persistent nausea and vomiting, an extremely rare occurrence in my experience.

No purgatives are ever given. They are not only unnecessary but are capable of doing great damage. The bowels are let completely alone until the fourth or fifth day, when, if they have not moved of themselves as we like to have them do, a small low enema of a saturated solution of magnesium sulphate or of alum is given. No milk is ever given until the bowels have moved well several times.

These are some of the factors that, in my opinion, have a distinct influence upon our mortality and I present them to you for your consideration and discussion.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B. MURPHY, M. D. — E. WYLLYS ANDREWS, M. D.
FREDERIC A. BESLEY, M. D. — WM. R. CUBBINS, M. D.

ACUTE AND CHRONIC PYELITIS. By H. Lenhartz.

Lenhartz, in a very interesting article, details the findings in 80 cases of pyelitis, observed in the Eppendorf Hospital at Hamburg. Only such cases as were primary in origin, or secondary to pregnancy or confinement, are included in this article — not those forms which occur in cases of enlarged prostate, calculus, or spinal disease.

Pathogenesis. He holds that the infection in the great majority of these cases ascended from the external genitalia. As 74 of his 80 cases were women, he thinks that the anatomical peculiarities of the female external genitalia predispose to an ascending infection.

Etiology. Active in 66 cases the bacillus coli communis was found in pure culture. In 2 cases the lactic acid bacillus alone. In 2 cases the proteus alone. In 1 case Friedländer's pneumobacillus. In 3 cases the paratyphus bacillus. In 1 case bacillus coli communis and proteus.

Predisposing. (*a*) Women. (*b*) Pregnancy and confinements. Menstruation, in 33 of 59 cases. In some cases the onset was simultaneous with menstruation, others ended just as the flow began. Severe chilling of the abdomen seems to play a rôle. (*c*) Right kidney 36 times, left kidney 17 times, both kidneys 24 times. Unknown in 3 cases.

Symptoms referable to the bladder, occurred in only 5 cases. Signs pointing to involvement of the kidney parenchyma only in 4 cases.

Diagnosis. (*a*) Fever was present in 74 per cent of the cases. Its onset and course were often very characteristic. A chill was often present at onset, and in relapsing cases during the course. Increased temperature usually lasts 6 to 7 days — can last, however, from 3 to 18 days. Varieties: 1. Continuous fever with crisis, simulating pneumonia; 2. Remittent fever with lysis; 3. Cases with a cyclical course. Fever relapses after running its course and remaining latent for a while. In 18 cases the relapse began shortly before or after menstruation. These relapses may be due to (1) an acute recurring bacterial infection of the renal pelvis, (2) an infection of the other previously healthy pelvis. (*b*) Blood — Leucocyte count may be normal or show an increase as high as 26,600. Bacillus coli found in blood in only 2 cases. (*c*) Palpation — Marked tenderness on palpating affected kidney. In 12 cases a retention tumor of the pelvis, the size of a child's head, could be felt. (*d*) Urine — Is usually very turbid. Marked amount of pus in severe cases, often mixed with blood. Decomposition takes place rapidly on exposure. Reaction acid. Albumen one-fourth to 2 to 4 pro. m. Microscopical — Red blood corpuscles, pus cells with groups of agglutinal bacilli, conical epithelium such as is found in the renal pelvis. Bacteriological — Bacillus coli communis in pure culture in 66 cases.

Differential Diagnosis from Appendicitis. Influenza, pneumonia, and from other renal diseases. In 3 cases sciatica on the same side as the pyelitis, accompanied the onset. In 2 cases stones were found by the X-rays. Course — Usually acute. Seven cases were chronic, and of these 5 showed a febrile course, with frequent relapses and bacteriuria. The proteus cases were very severe and chronic in their course. Prognosis.— There were 5 deaths, of these 3 were due to the pyelitis. Clinically, of the 75 dismissed, 54 recovered, 14 were improved, and 7 unimproved. Bacteriologically speaking, only 16 were cured, 20 improved, and 39 not cured. Treatment — Lenhartz recommends the mechanical washing out of the pelvis by drinking large amounts of mineral waters, or better, hot linden-flower tea. Urotropin gave the best results of remedies of its class but it did not stop the bacteriuria. The retention tumors usually disappear of themselves, if not puncture can be resorted to.— *Münchener Med. Wochenschr.*, No. 16, 207. CHARLES M. MATTER.

CYSTOGRAPHY AND PYELOGRAPHY. By Prof. Fritz Völcher and Dr. Alexander V. Lichtenberg. From the Heidelberg Surgical Clinic, Prof. Czerny, Director.

These writers have worked out a method of determining the form and size of the urinary bladder and renal pelvis by means of X-rays.

1. *Bladder.* As a solution for filling the bladder a 2 per cent solution of callargol was used; the bladder previously being washed out with a 1 per cent solution of the same. They succeeded in obtaining satisfactory shadows of the bladder even in fat individuals. In a few enormously fat patients a 5 per cent solution was used. The exposures were made with medium soft Müller's tubes, and with the aid of body compression after the method of Albers-Schönberg.

Cystographs were made 105 times in 82 individuals — 55 men and 27 women. Forty to 400 c.c. of the solution was used to fill the bladder.

In 24 cases the normal male bladder was examined. There was noted a variation in form between the contracting and non-contracting bladder — this variation being present at all stages of fulness.

When not contracting, the bladder when empty or nearly so, was found to have a flat saucer-like shape, with concavity upward. As the bladder fills it becomes broad above and less concave; and narrow below, or cone-like with apex downward. The upper part finally rises and becomes rounded, still remaining narrow below. This varies from some previous descriptions which have represented the full bladder as round.

When strongly contracting this form changed to a spindle or cylindrical shape, the axis apparently being from the orificium internum upward.

Five female bladders examined during pregnancy (6–9 months) showed a marked transverse dilatation. A hollow in the bladder fundus also was noted, in which the uterus lay.

In 7 cases of prolapsus uteri, cystographs showed the bladder in abnormal positions — in one extreme case the shadow being outside the pelvis, between the thighs.

In cases of hernia (number not given) it is noted that the small herniæ showed little appreciable change in position. Patients with large herniæ showed a drawing of the bladder toward the side upon which the herniæ existed.

In 5 cases bladder diverticula were found, 2 being evidently congenital and 3 resulting from prostatic hypertrophy. One of these 3 showed a single diverticulum reaching upward nearly to the navel.

In 19 other cases of prostatic hypertrophy it was noted that the bladder did not show the usual pointed lower extremity, but had a flat or upwardly curved lower portion. The whole bladder was found to be higher than normal.

In 2 cases of pelvic tumor, and 1 case of pelvic abscess, changes in form were noted. Our case of tuberculosis showed a lateral dilatation.

2. *Pyelography.* The same solution was used. The normal capacity was found to be 3–5 c.c. In a few cases 10–15 c.c. were used. Descriptions are given of forms of the renal pelvis. The method was tried in 16 women and 1 man. In 9 cases an excellent shadow was obtained. By this method changes in position of the kidney, dilatation of the pelvis may be detected. The ureter cannot as a rule be photographed, as the fluid does not remain in position.— "Cystographie and Pyelographie," *Beiträge zur klinischen Chirurgie*, vol. lii. W. C. DANFORTH, M. D.

THE USE OF THE X-RAY IN THE DIAGNOSIS OF RENAL AND URETERAL CALCULI. By F. H. Baetjer, M. D.

Baetjer describes in detail his method of making the radiograph do the detection of renal and ureteral calculi. The efficiency of the X-ray in diagnosis is well shown. In three years 291 cases were examined at the Johns Hopkins Hospital for renal or ureteral stones. In 75 cases calculi were found by the ray, 53 of these were operated upon and the diagnosis confirmed by the surgeon. The remaining 22 for various reasons have not been operated upon. Of those in which a negative diagnosis was made, 60 were explored and in one case only were calculi found. The remaining 156 cases were not explored and subsequent history seems to confirm the negative diagnosis.

The author believes that with good apparatus and technique, calculi, when present, can practically always be found. That the X-ray examination gives definite and positive information as to the location, number, and size, of calculi present. That an X-ray examination should always be made in suspected cases, that it is not dangerous, and, furthermore, gives no discomfort to the patient. That indirectly the examinations are of great benefit to the diagnostician as they enable him to define more sharply the symptoms associated with the presence of calculi, and associate characteristic groups of symptoms with its presence that he is not now able to connect definitely with the disease. In this way the X-rays will increase the possibility of making clinically a more definite diagnosis of this condition.— *Johns Hopkins Hospital Reports*, 1906, vol. xiii, p. 479. GEORGE E. BEILBY.

ON THE TORSION OF PEDICELLATED FORMATIONS. By Surgeon-Major S. Stiassny, M. D.

My reason for speaking just here and just now on the question of the torsion of pedicellated forma-

tions, is the fact that a new edition of Veit's manual is about to appear and that there still is confusion in the terminology, which hinders statistical work on Küstner's law.

In order to find out the ultimate reason of this confusion I criticized the objects selected for comparison by the different authors.

With regard to Küstner, who uses a spiral as a tertium comparationis, I should like to remark its line is the same as that of a screw (the leading screw of a gimlet, etc.) But, as the latter has not been so exactly described or so scientifically treated, I prefer the screw as an object of comparison.

The comparison with the hand of a clock, made by Cario, is objected to, owing to the fact that the hand moves in a horizontal plane, whereas the torsion of a pedicellated formation takes place on a curved plane. In explanation of the difference between Pfannenstiel's and Schauta's opinion I would remark that the latter classified the spiral staircase, which is to serve as an object of comparison, according to whether the person ascending it turns round its vertical axis to the left or to the right. That classification is justified as long as there is no scientifie classification given in any technical work. But now such a classification could be made on the basis of the guideline of every spiral staircase, which itself represents a spiral line. The result thus obtained corresponds to the definition I obtained in answer to a circular I sent to a number of technical men (practical and theoretical ones) who designate a staircase as turning to the right when the bannister is outside on the right, but as turning to the left when the bannister is on the left and the spindle on the right. One might compare also a snail-shell to a spiral staircase. Without exception that shell is said to wind to the right which turned right side up has its mouth to the spectator's right; in the opposite case, when the mouth is towards the left we say the shell winds to the left.

The comparison made by Gebhard and Jolly, namely, the supination or pronation of the hand of the female patient, first necessitates that the observer identify himself with the patient and state whether the cyst is bent towards the right or the left, certainly not a very simple procedure.

As the spiral line is the standard line for all objects of comparison, I suggest the screw itself as the object best described and most reliably classified.

We shall with Bach be able to explain the origin of a spiral line by winding the plane of a given angle on to a straight cylinder in such a way that the one side coincides with the peripheric line of a normal section of the cylinder; at the same time the other side describes a curve on the cylinder which we call a helical line. According to the direction in which the angle is wound on we distinguish between a right and a left helical line; the former ascends on this side of the geometrical plane rising from left to right, the latter from right to left. Or, according to Hoyer: If the ascending angle is less than 90°, so that the helical line rises from left to right, the thread is a right-handed one; if the angle is greater than 90° the thread must rise from right to left and it is a left-handed one. If we place such a screw side by side with Küstner's schematic figure there can be no doubt as to the correctness of the classification.— *Twelfth Congress of the German Society of Gynecology.*

AUTHOR'S ABSTRACT.

ACUTE PANCREATITIS. By L. Boruhaupt.

L. Boruhaupt discusses this condition in connection with two cases. Both patients were about sixty years of age, and had had no previous illness. It was marked by sudden onset, with violent abdomial pain, vomiting, normal temperature, and pulse 80°–90°. There were marked symptoms of intestinal obstruction (stoppage of gas and feces); with partial relief of this in one patient but persistence in the other. Both were operated upon: drainage in one, complete suture in the other. Both died on fourth day after operation. Post-mortem examination showed no changes in the abdominal cavity except edema in the vicinity of the head of pancreas, microscopic necrosis of pancreas. The second case presented extensive necroses in omentum, appendices epiploicæ and root of mesentery. No gallstones or arteriosclerosis were present in either case — no alcoholism. Adiposity was present in both cases; vomiting was marked in the beginning, subsided later — not feculent. Abdomen was inordinately distended and soft. The second case showed traces of sugar in the urine (diffuse affection of pancreas). Boruhaupt discusses differential diagnosis in detail. Acute gastroduodenitis, poisoning cholelithiasis, acute appendicitis, perforative peritonitis, coprostasis, obturation by enterolith or gallstone, intestinal tumor, strangulation, thrombosis of mesenterical vessels, arrest of ureteral stone are considered. The operative prognosis depends upon the extent of the lesion, hence, interference will not be successful if the pancreas necrosis has exceeded a certain limit and the system has, in this manner, absorbed a lethal dose of the poison. In a partial necrosis of the gland, operation and tamponade of the bursa omentalis offers better chances than conservative treatment. Boruhaupt mentions briefly the immunization with trypsin in conjunction with opera-

tive treatment.— *Archiv für klinishe Chirurgie*, vol. lxxxii, p. 1. E C. RIEBEL.

BONE-CYSTS. By Prof. Alexander Tietze. From the Allerheiligen Hospital in Breslau.

Tietze reports 2 cases of bone-cysts from his own experience. Mickulicz' work is quoted and his conclusions agreed with:

1. That these cysts are a disease of the growth period. Of 24 cases, 20 were under 20 years, and only 2 over 30.

2. The long bones of the extremities are particularly attacked, especially those portions which are the seat of the greatest growth.

3. In most cases an initial trauma plays a part. This may be several months antecedent to the appearance of the cyst.

4. The process is benign throughout. No metastases or recurrences after operation have occurred.

Clinically the following points are emphasized:

1. The disease begins almost unnoticed, so insidious is the onset.

2. Slight pains begin, which from time to time increase. The extremity becomes slightly lame.

3. The mobility of the joint is not impaired.

4. By inspection or palpation, as a rule, no abnormality is found, or at most a painful point.

5. Later the limb appears to be somewhat shorter, and shows some convexity.

6. Months or years later a fracture may occur at the point at which the pain previously was found.

The pathology of these cysts is thoroughly discussed. The conclusions are as follows:

1. All the described cysts appeared to be without a distinctive epithelium, often even without capsule, and appeared to be defects in the tissue, or as softening cysts. The wall, when present, is a closely meshed connective-tissue, which often contains pigment in granule form. The favorite location is the spongy tissue at the bone ends. Size varies from that of a pea to large enough to encircle $\frac{1}{3}$ of the bone of the extremity.

2. One may differentiate between cysts, with surrounding tumor tissue, and those which are embedded in normal bone without any transition-zone.

3. This tumor tissue, when present, is a hard, tough, leathery white, or yellow mass.

4. The cysts are as a rule single, even when several are placed closely together. The divisions may be lost after a time so that partial divisions may be present.

Tietze believes that these cysts should not be looked upon as true tumors, but rather as a form of connective-tissue degeneration following the type of a chronic inflammatory process. "Neber Knochencysten." — *Beiträge zur klinschen Chirurgie*, vol. lii. W. C. DANFORTH, M. D.

THE INFLUENCE OF TRAUMA IN SPINAL AND CEREBRAL DISEASE. By J. Riedinger.

Riedinger believes that in the slowly progressive diseases of the cord and brain, such as progressive spinal muscular atrophy, or tumors of the brain, the question as to whether or not the disease was preceded by a trauma, is of scientific rather than practical interest. But even so, the results of the most exact scientific investigations speak against a causal relationship existing between trauma and diseases of the central nervous system. It must be admitted, from a practical point of view, however, that trauma may be a factor in developing or in exaggerating the symptoms of a disease which has already begun to manifest itself. In such cases, the trauma is to be regarded as a complication of the disease, and not the disease as a complication of the trauma. Moreover, we must always exercise great care in establishing just how much of a physical element is present; for patients are prone to dwell upon and exaggerate the effect of a trauma.—*Centralblatt für Chirurgie*, No. 19, 1907. M. G. SEELIG, M. D.

PNEUMOTOMIES IN RUSSIA. By A. A. Opkin.

Opkin collected all the data that he could find in Russian literature pertaining to the surgery of the lung, and he summarizes his material as follows:

1. The X-ray is almost indispensible as a method of confirming the ordinary methods of examination.

2. Aspiration of the suspected focus is always obligatory, and should be followed *immediately* by operation.

3. It is not absolutely essential that a pneumotomy should be performed at the site of pleural adhesions.

4. Suture of the pleura is of the greatest importance in preventing pneumothorax.

5. A betterment in operative results may be expected from improved means of diagnosis, as well as from improvements in technique, such as the Sauerbruch chamber.

6. In all operations upon the lungs, local anesthesia is always to be used, unless there happens to be a special contraindication.

7. The best results in lung surgery have been secured in acute cases of gangrene of the lung, and pulmonary abscess.

8. The results of operations performed for echinococcus of the lung have been good, but those for bronchiectatic cavities have been unfavorable. On the whole, the late results of operations upon the lungs have been very satisfactory.— *Archiv für klinishe Chirurgie*, Bd. 82, Heft 4. M. G. SEELIG, M. D.

A MODERN METHOD FOR THE PERFORMANCE OF PERINEAL LITHOTOMY. By Hugh H. Young, M. D.

The very low mortality, and the admirable subsequent results, which the author has obtained in the removal of calculi through the perineum immediately after perineal prostatectomy, has led him to advocate the return to the perineal route as the method of choice where no prostatic lobes had to be removed. His opinion in this regard has been strengthened by an extensive comparative study of statistics which clearly established that the mortality after perineal lithotomy both in young, adult, and aged patients is markedly better than after suprapubic lithotomy. The objections formerly advanced against the employment of perineal lithotomy, the author believes, are fully overcome by the adoption of the new method which he describes. The method is essentially that of the author's for the performance of perineal prostatectomy, except that he makes a single left-side incision through the prostate which he carries up as far as the vesicle orifice. Dilatation of the wound and vesicle orifice gives free access to the bladder so that very large calculi may be removed with ease. In rare instances division of the vesical neck may be necessary. It was once resorted to by the author for the removal of a stone 6 cm. in diameter.

Young concludes that the objections to perineal lithotomy, which have virtually caused its abandonment by surgeons, have been that the operator could not see what he was doing, that the incision occasionally went into the rectum, that the space afforded was insufficient for the removal of very large calculi, and that the division of the external sphincter occasionally resulted in incontinence.

The advantages which he claims for the new method are that the operator can see what he is doing; that the external sphincter is preserved, thus avoiding incontinence; that a large space is afforded in which the urethra can be opened under visual direction, thus avoiding injury of the rectum and furnishing sufficient space for removal of even very large calculi, with an attendant division of only two insignificant structures in the median line; that the urethral wound can be repaired by sutures thus restoring normal urination immediately after operation; that the convalescence is remarkably rapid, the functional result quickly established, and the mortality almost nil.— *Johns Hopkins Hospital Reports*, 1906, vol. xiii, p. 385.

GEORGE E. BEILBY.

URETHRAL DIVERTICULA IN THE MALE WITH REPORT OF A CASE. By Stephen H. Watts, M. D.

The author reports a very interesting case of acquired diverticulum resulting from an injury to the bulbous urethra, and presents a comprehensive study of the recorded cases both of congenital and acquired diverticula. He draws the following conclusions:

1. Urethral diverticula in the male are of rather infrequent occurrence: The diagnosis is as a rule not difficult.

2. Their pathogenesis is varied. The etiology of the congenital variety is not well understood. Those of the acquired variety may form a simple dilatation of the urethra behind a stricture or a calculus, or they may result from a perforation of the urethra due to a traumatism or to the rupture of an abscess or cyst into the urethra.

3. The constant symptom is the presence of a tumor at some point along the course of the urethra. Pressure upon this tumor usually causes urine to flow from the external meatus. It enlarges and becomes more tense on urination. The pouch can usually be catheterized. Urination is usually difficult and sometimes there is complete retention.

4. The following complications may occur, the formation of calculi in the pouch, cystitis, periurethral abscesses, and extravasation of urine.

5. The treatment varies somewhat with the case. Where the pouch is the result of a dilatation of the urethra behind a stricture or a calculus, the removal of the obstruction is all that is required. When the pouch is congenital in origin or results from a perforation of the urethra, the extirpation of the sac and suture of the opening into the urethra is indicated. The results of surgical intervention are very satisfactory.—*Johns Hopkins Hospital Reports*, 1906, vol. xiii, p. 49.

GEORGE E. BEILBY.

TOTAL EXTIRPATION OF THE URINARY BLADDER WITH DOUBLE LUMBAR URETEROSTOMY. By Th. Rovsing.

Experience during the past 10 years has led to the conclusion that extirpation of the bladder is a not unfrequently indicated procedure. Many of the microscopically benign bladder tumors, such as the papillomata and other villous growths, are in reality malignant tumors, which can be cured only by this radical operation. The operation offers a

particularly hopeful prognosis, because of the fact that bladder tumors are very slow in metastasizing, either in the neighboring lymph-nodes or in distant organs, and the only reason that the operation has not been performed more frequently is found in the very high operative mortality, 50 per cent, due not so much to the immediate technical difficulties inherent in the operation, as to the ascending pyelonephritis consequent upon the transplantation of the ureters, into the intestine (rectum, sigmoid) or vagina.

Rovsing comments on the dangers and fatalities consequent upon transplantation of the ureters into the rectum, sigmoid, and vagina, and then details the method that he has used, with excellent result, in 3 cases of extirpation of the bladder.

The bladder is filled with 200 c.c. of a phenosallye solution and the patient put in Trendelenburg position. The bladder is approached through a curved transverse incision, which divides the insertion of the recti. The bladder is dissected free in front and above, and then the base is freed (without opening the peritoneum, if possible). Each ureter is divided between two ligatures. The neck of the bladder is now mobilized and divided after it has been crushed with an angiotribe. In males the operation is somewhat more difficult, because the prostate must be separated from the rectum. The wound is packed with a Mikulicz drain, the recti sutured with aluminum bronze wire, and the skin sutured around the drain. This part of the operation usually takes one half to three fourths of an hour.

Small incisions are now made in both lumbar regions, extending outward from the margin of the erector spinæ. The ends of the ureters are pulled through these incisions, and allowed to lie there, wrapped in sterile gauze, and not sutured in place; a catheter is placed in each ureter and allowed to remain for about 8 days.

The patient is provided with a belt and urinal, by means of which all the urine is collected, without causing him any discomfort.— *Arch. f. klin. Chir.*, Bd. 82, Heft 4. M. G. SEELIG, M. D.

TETANIA PARATHYREO PRIVA. By O. Erdheim.

This is unquestionably the most painstaking piece of clinico-pathologic work, dealing with the question of parathyroid function that has appeared during the past few years. Erdheim's work had its genesis in three cases of fatal tetany following goitre operations in human beings. His object was to confirm or negative the doctrine of Vassale and Generali, that tetany was ***not*** due to loss of thyroid substance, but rather to loss of the parathyroids.

The work is based upon animal experimentation, white mice being the animals chosen as most suitable, owing to the fact that the neck organs of these animals are so small that serial sections of the whole neck may be made with comparative ease. A very careful description of the anatomy of the parathyroids is given, and the technique of extirpating them is described in detail. Erdheim states that the question of accessory parathyroids may be left out of consideration in dealing with white mice, owing to the fact that these structures are microscopic in size, and are practically functionless.

Erdheim found that destruction of both parathyroids (there are only 2 in white mice) was invariably followed by tetany and death, within a period of 3 months. A particularly interesting fact disclosed by these experiments was that trophic disturbances almost always follow complete parathyroidectomy. All the mice operated upon showed a degeneration and loss of the incisor teeth, and a tendency to the development of cataract. In those cases in which only one parathyroid and a half was removed, tetany and trophic disturbances developed but seldom, and then only to a mild degree. In those cases in which only one parathyroid was removed, tetany developed in one third of the animals experimented upon, and was very transitory in nature; none of these animals died. It was not possible, in these cases, to establish that the remaining parathyroid underwent compensatory hypertrophy.

Erdheim believes that in human beings also, tetany following operations upon the thyroids is due to removal of the parathyroids. He bases this belief upon the autopsy findings in three fatal cases of tetany following partial thyroidectomy. In all of these cases it was demonstrated that the parathyroids had been removed.— *Mitt. a. der Grenz. d. Med. u. Chir.*, Bd. xvi, Heft 4 and 5.

M. G. SEELIG, M. D.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF GYNECOLOGY

UNDER THE CHARGE OF

J. CLARENCE WEBSTER, M.D. — E. C. DUDLEY, M.D.
JOHN C. HOLLISTER, M.D. — F. W. LYNCH, M.D.

THE TREATMENT OF PUERPERAL SEPSIS BY ACTIVE DISINFECTION OF THE UTERUS. By A. Knyvett Gordon.

Gordon describes his method as follows: The cervix is exposed, dilated, if necessary, and steadied with a volsellum. The whole endometrium, down to the muscle, is removed with a sharp curette. This has been specially made for him, and in general design resembles Sims's instrument. The extremity of the cutting hoop is, however, flattened, and is much larger than usual, measuring an inch, and an inch and a half across, in the two sizes respectively. By this means the possibility of pushing the instrument through the walls of a friable uterus is avoided. The cutting edge, too, is turned away from, and not towards, the mucosa when the curette is in position. The instrument is made as light as possible. When the muscle has been thus laid bare, and no loose masses are felt with the finger, a douche is given if the bleeding is severe and the whole raw surface is swabbed over carefully with a Playfair probe, tipped with gauze soaked in undiluted "medical" izal fluid. This part of the operation is performed with great care, and with as much force as can be safely employed, the drug being well rubbed into the uterus. Since the izal acts as a hemostatic, there is usually no occasion for hurry. The uterus is then packed either with gauze or lint soaked in a 1 in 200 solution of the same drug, or with 10 per cent izal gauze. The vagina is loosely plugged also. The plugs are taken out the next day and not re-inserted. No douche of any kind is given, but, if necessary, the swabbing is repeated. Vaginal douches are not employed during the subsequent period.

In 86 cases where this method has been employed Gordon's mortality was 20 per cent only; whereas, out of 79 cases treated by general means alone, with or without intra-uterine douches, the mortality was 46 per cent. These cases are strictly comparable, since no kind of selection was made, many being curetted who appeared to have but little chance of recovery. In so far as serum treatment is concerned, the advantage, if any, lies with the cases that were not curetted; serum of one type or another having been employed at first in almost every instance where izal was not used, while of late the knowledge that has thus been obtained of its method of action has enabled a certain amount of selection to be made. In the whole series of 165 cases there have been only 12 in which obvious signs of danger to life were absent. Many had but a few hours to live, and impending death or unmanageable delirium was the usual motive for sending patients to the hospital.

The writer is inclined to give credit for these good results to the use of izal. He thinks that this drug has a definite selective action, since it does not attack healthy mucous membrane, but has a marked effect on necrotic tissue. He has never seen any toxic symptoms develop from its use, and in several cases subsequent pregnancy has taken place.— *Journal of Obstetrics and Gynecology of the British Empire*, vol. xi, p. 17, Jan., 1907.

CAREY CULBERTSON.

ARTERIOSCLEROSIS OF THE UTERUS AS A CAUSE OF PERSISTENT HEMORRHAGE. By A. Solowij.

Solowij reports a new case of arteriosclerosis of the uterus, the condition occurring in a multipara. 41 years old, the microscopic diagnosis revealing a chronic metritis with arteriosclerosis uteri. After describing the case in detail and reviewing the literature, the writer concludes that the diagnosis of a non-senile arteriosclerosis of the uterus, characterized by morbidedly persistent hemorrhage and hypertrophy of the organ, is not easy to make. It relies first of all upon an otherwise negative uterus, from a pathologic point of view. Neoplasmic, adnexal diseases, abnormalities of uterine position, general constitutional diseases (as hemophilia), must all be ruled out before arteriosclerosis may be reasonably diagnosticated.

As regards treatment, therapeutics is of little use, except in the lighter forms of the non-senile variety. At times rest in bed and regulation of the intestinal tract is sufficient, since such treatment relieves the congestion of the pelvic organs. Occa-

sionally swabbing out the uterine cavity with ferric chlorid is of value, in the meanwhile repeated vaginal tampon being employed. Ergot is entirely unsatisfactory since it is impossible for this drug to bring the rigid vessel-walls into contraction. For like reason curettage is of no avail.

Severe cases of arteriosclerosis of the uterus have proven all methods of treatment but one to be useless. The menorrhagia becomes steadily more marked, the inter-menstrual periods become shorter and shorter until the hemorrhage is more or less continuous. Hence one should not put off too long the one certain method of cure — total exstirpation of the uterus. This conclusion should not be difficult to decide upon, since most of the women already are approaching the menopause.— *Die Sklerose der Arterien der Gebärmutter als Ursache von unstillbaren Blutungen. Monatschrift für Geburtshülje und Gynäkologie*, Bd. xxv, Heft 3, March, 1907. CAREY CULBERTSON.

THE TREATMENT OF OVARIAN PROLAPSE BY SHORTENING THE OVARIAN LIGAMENT. By Victor Bonney.

The operation advocated by Bonney consists in pleating the ovarian ligament by means of a "gathering" stitch, which beginning on the posterior aspect of the uterus, just within the point of origin of the ligament, terminates at its attachment to the ovary. The ligament by this means is not only shortened but thickened, and the ovary is brought up under the uterine cornu. The writer makes the following clinical division of his cases: (*a*) Primary uncomplicated ovarian prolapse; (*b*) Ovarian prolapse secondary to or coincident with retroversion of the uterus; (*c*) Ovarian prolapse caused by or complicated with disease of the ovary or tube, with or without fixed retroversion of the uterus. In group (*a*) he regards the operation as indicated in cases of primary ovarian prolapse associated with dyspareunia and chronic ovarian pain. In group (*b*) the operation is indicated in such of the cases as are not curable by pessaries, together with ventrofixation or suspension of the uterus. Attention is called to the fact that ventrofixation of the uterus alone often causes the symptoms of ovarian prolapse to be accentuated, because the operation lifts the prolapsed ovaries off the pelvic floor, and causes an increased tension on their already weakened suspensory apparatus. Ventrofixation lifts the ovaries from out the ovarian fossæ, and leaves them unnaturally exposed to the force of gravity. Hence it is advisable to shorten and strengthen the ovarian ligament as a routine practice, when performing ventrofixation or similar operations. In operations for diseased uterine appendages, group (*c*), salpingectomy alone should be the operator's aim. Conserved ovaries, unless fixed in a position far removed from the diseased peritoneal bed in which they are lying, continue to give symptoms, and are liable to cystic degeneration. The uterus is liable to become retroverted after operations for inflammatory tubal disease. Hence the procedure advocated is removal of the diseased tubes, ventrofixation of the uterus, and shortening the ovarian ligaments after the method already described. In conclusion, Bonney claims the following advantages for his method: 1. The removal of the focus of the disease; 2. The conservation of the ovaries in a place far removed from the diseased pelvic peritoneum; 3. The avoidance of postoperative ovarian prolapse; 4. The avoidance of postoperative retroversion of the uterus.

Abstract of paper read before the London Obstetrical Society, Dec. 5, 1906.— *Journal of Obstetrics and Gynecology of the British Empire*, vol. xi, p. 89, Jan., 1907. CAREY CULBERTSON.

THE IMMEDIATE RESULTS OF CONSERVATIVE OPERATIVE MEASURES ON THE TUBES AND OVARIES. By Hunter Robb.

Robb reports 419 cases to date — the work of the last seven years.

"From our experience in this line of work (inflamations of tubes and ovaries) we have been able to thoroughly convince ourselves of the great advantages that may be obtained by preserving as much as possible the integrity of the pelvic organs.

"In two to five per cent of such cases, a second operation is necessary for permanent relief. If an ovary or a portion of an ovary can be saved before the menopause has begun or even during the time in which the patient is experiencing this change, we have found that not only immediate convalescence, but also the subsequent condition of the patient, is in every way more satisfactory.

"It is a wiser procedure to remove the tube whenever a pyosalpinx exists (macroscopically). This is not always so in ovarian abscesses."

A full analysis of cases follows. Among the *data*, he says that 572 ovaries were saved in 419 cases (1.34 to each patient) and 214 tubes (one half tube to each patient); 104 ovaries were saved in 97 pus cases (1.08 to each patient); 1 tube to every 6½ patients was saved in pus cases.

In pus cases the abdominal wound became infected in 7.53 per cent cases. Average leucocyte count in pus cases was 17.59 per cent. Drainage employed in pus cases: Abdominal alone, 0; vaginal, 24; abdominovaginal, 4; total number of infections of abdominal wound, 8.56 per cent; deaths in pus cases, 3.04 per cent; deaths in whole

number of cases, 1.67 per cent.— *Am. Jour. Obstet.*, Feb., 1907.

PERITONITIS IN YOUNG GIRLS FOLLOWING ACUTE SALPINGITIS. By Prof. Dr. Riedel.

"Peritonitis following purulent salpingitis is more frequent among very young girls than is thought. Typical attack is characterized as follows: Acute, severe abdominal pain, vomiting, temperature of 39° or 40°, pulse fast and small, distention and rapid emaciation, apathy, cyanosis. Abdominal cavity contains thin pus or pus rich in fibrin. Never foul, but yellow and odorless. Tubes are at times red and swollen, and pus can be expressed. At times they are intact. The prognosis is absolutely unfavorable; all die."

Eight cases are here reported in detail, the age varying from 4½ to 9 years. Five of these eight had salpingitis, as found absolutely at operation or autopsy. The others probably had salpingitis.

There was no evidence of gonococcus infection. Cultures showed the usual pus organisms — streptococcus and staphylococcus.

"The infection could not be otherwise than through vagina, uterus, and tube."

All children were entirely well before this attack; no previous infectious disease. Hæmatogenous infection can be excluded, but how the infection is carried into the genitals of small girls is unknown. The rapidity of the infection was illustrated by one case. Operation within eight hours after onset. "Därme wie mit Schleim bedeckt." No free fluid, and genitalia intact, probably because of the rapid passing into the peritoneum of the infection. The author thinks this disease of clinical importance, because of its frequency. Of 48 girls with appendicitis the infection came by way of the genital tract in 14 per cent; in adults, in only 1.8 per cent. The difficulty of diagnosing such an affection for appendicitis is emphasized (usually not possible without operation) also from acute abdominal tuberculosis and acute thrombosis of the portal vein, more rarely ichinococcus. Operation, whether by flank or median line incisions, has been of no avail. He doubts the justification of eventration in children.— *Die Peritonitis der Kleinen Mädchen in Folge von Acuter Salpingitis. Archiv. f. klin. Chirurgie*, bd. lxxxi, th. 1.

JOHN C. HOLLISTER.

ABNORMAL INVOLUTION OF THE MAMMARY GLANDS WITH TREATMENT BY OPERATION. By J. Collins Warren, M. D., Boston, Massachusetts.

Changes in the breast at the menopause are called abnormal involution and this is divided into two classes: (1) cystic, (2) proliferative. Under proliferative we have (a) acinal, (b) papillary, (c) adenomatous. This condition, the author feels, can in the large percentage of cases be treated by conservative operations, although he admits it is necessary to have microscopic sections at the time of operation, in order to make sure that there has been no malignant degeneration. The argument advanced against radical removal of the breast in these cases, is the disfiguration, and increased danger of the more extensive wound. In making the examination of the breast the surgeon should stand behind the patient, and palpate the breast from before backward. In this way it is possible to exclude the nodular condition which so often leads us astray at this time of life. When, according to an examination, the tumor is benign he advises the following method of procedure: An incision along the outer curvature of the breast is made down to the fascia of the pectoral. The posterior surface of the gland is dissected up and everted by pressure on the anterior surface. Now the gland may be carefully inspected and the cystic portions removed. This wound leaves a little scar, and no deformity if deep sutures of catgut fasten the remaining portion of the gland together, and suture that to the fascia.— *American Journal of Medical Sciences*, April, 1907.

WM. R. CUBBINS.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. BACON, M. D. — RUDOPLH W. HOLMES, M. D.
C. v. BACHELLÉ, M. D. — HUGO EHRENFEST, M. D.

PUERPERAL GENERAL PERITONITIS. By Ellice McDonald.

"No great advancement has been made in preventive treatment." Course is like that of severe infection elsewhere. Severity is due to: 1. Pregnant woman more susceptible to infection; 2. Traumatism of labor, with easy atrium.

Endometrium usually seat of infection. Spreads with veins and lymphatics to general circulation. Essential lesion in streptococcus is a periuterina lymphangitis, which is more often associated with thrombosis than with actual pus.

The peritonitis — usually streptococcic, and marked by severe symptoms — local seat is about the broad ligaments, and pus is generally distributed about abdomen, with little evidence of repair. Intestinal paralysis soon follows, and in the streptococcic form is usually fatal. Author has seen two cases recover.

Other forms of peritonitis, as those caused by the "lightening up" of old foci, and not through genital canal during puerperium, from bruisings of tumors, rupture of pus-tubes, etc. This is not a lymphangitis, but both forms may be associated.

Streptococcus is cause in forty per cent of all cases.

Staphylococcus, pneumococcus, gonococcus, and colon bacillus are also mentioned.

A table of eleven cases is reported, and the following deductions drawn: Streptococcus in three cases; associated with other organisms in three cases; staphylococcus aureus in two cases. The staphylococcus aureus has been seldom isolated in puerperal infection; type of infection severe, with tendency toward pyæmia and metastatic abscesses.

"Gonorrheal infection, though one of the most common varieties of infection in puerperium, is the least frequently discovered." (In two of author's cases — one alone, and one associated with colon and streptococcus.)

Gonorrheal infection usually extends by direct continuity of mucous membrane; salpingitis and pelvic peritonitis are the most common results.

Pneumococcus infection, uncommon; comparatively slight severity (post-mortem in author's case described). "The pneumococcus is being more frequently isolated in puerperal infection as the bacterial methods of study improve." The peritonitis is characterized by a rich plastic exudate with adhesions and encapsulation of the exudate. Diagnosis never clear without bacterial examination. Onset usually acute, followed by chronic stage, with mild symptoms and indefinite masses in abdomen. Prognosis, as a rule, favorable, but operation necessary. Evacuation and drainage is usually sufficient.

Puerperal peritonitis from direct traumatism or necrosis of a tumor is spoken of, but no incidents of such are in author's cases.

Fibroids, ovarian cysts, teratoid ovarian tumors, are all mentioned.

Appendicitis. Under this heading the fact that adhesions about an appendiceal abscess may be broken by contraction of uterus at labor, and a general peritonitis result, is spoken of. Early operation gives best result.

Diagnosis of general peritonitis in puerperium, not easy. Presence of pathogenic micro-organisms in lochia is not proof of infection. Baum and Ligwartz, Leo, Shenk, and Schieb are all quoted, and then the author says: "However, the presence of certain bacteria in the uterine lochia, as shown by smears and cultures, is some indication of the cause of infection."

Pain. Usually a prominent symptom. Two sources: 1. "Most of the pain in peritonitis is due to an accompanying lymphangitis. The lymph-vessels of the intestines press upon the sensory nerves as the lymphangitis spreads. 2. From the exterior of the gut, and is due to presence of an irritant causing an inflammation of the peritoneum. Also caused by inflamed intestinal covering rubbing against parietal peritoneum.

Rigidity. Usually early and trustworthy. Depends somewhat on suddenness of onset, and sometimes does not last long. Usually overcome by intestinal distention.

Tenderness. Not usually a marked symptom,

unless formation of much exudate and many adhesions.

Vomiting. Fairly constant; first at onset, and later bile-stained, fæcal, or hemorrhagic.

Temperature. Rather variable. Very high and intermittent, with most virulent bacteria.

Pulse. "A better indication of the condition than is fever."

Blood. Findings not pathognomonic. Usually diminution in red cells. Leucocyte count is increased (polymorphonuclear higher). Iodophilia especially useful in estimation of severity of the infection (Da Costa).

Bacteriology. Of blood and lochia of great importance. Smears of the uterine lochia often give immediate information in regard to the possible cause of the peritonitis.

Treatment. "Of uncomplicated puerperal peritonitis is that of peritonitis in the non-pregnant. Immediate laparotomy and removal of purulent material and focus of infection, if possible." "True, when the infection has resulted from previous foci (pus-tubes, etc.), but difference of opinion in lymphatic peritonitis cases.

Trendelenburg's resection of the veins of the broad ligament is of questionable value. Hysterectomy has been abandoned, unless there is a local lesion, but does give good drainage. Laparotomy; removal of focus with as little handling of intestines as possible; small openings with drainage-tubes; often vaginal drainage; evacuation of intestinal contents often of value. Lavage to be omitted.

The author emphasizes, also, the value of increasing the leucocytes and raising the oposnic index by the use of nucleic acid and vaccines. She calls attention to the fact that the blood serum in streptococcal infection does not acquire streptococcidal properties, and that destruction of the cocci is by phagocytosis. Antistreptococcus sera have not been successful until the use of properly prepared polyvalent serum. "Should be used." — *Annals of Surgery*, Feb., 1907.

REMOVAL OF THE LIQUOR AMNII AS A CAUSE OF DEATH OF THE FETUS AND CHANGES IN THE PLACENTA. By B. P. Watson, Edinburgh.

The author experimented on rabbits by opening the abdomen and removing the liquor amnii from one of two equal-sized gestation-sacs by puncture. In several, in order to control the placenta, it was removed. All but one of the animals withstood the interference well. After three to fourteen days, the animals were killed and the preparations examined. The author draws the following conclusions from his experiments:

1. The fetus dies at once after removing the liquor amnii. Death is caused by interruption of the circulation.

2. The dead fetus and placenta are retained in utero. The fetus undergoes degenerative changes and becomes flattened.

3. Changes in the placenta vary.

4. Fetal portions of the placenta degenerate slowly, fibrin accumulates in the mesoderm, and the cells of the ectoderm become granular.

5. After death of the fetus, there is no tendency to further development of the ectoderm.

6. The changes in the maternal placenta are not different from those seen in the normal development.

7. Secretion of liquor amnii ceases with death of the fetus. *Jour. Obstet. and Gyn. of the British Empire*, Jan., 1906.

W. B. FEHRING.

VENOUS THROMBOSIS IN THE PUERPERIUM. By Dr. Rieländer, Marburg.

Dr. Rieländer (Marburg) says that in 6,000 labors thrombosis occurred in the puerperium in 23 cases (.4 per cent). Of these, 10 cases occurred in primiparæ, 5 in para II, 3 in para IV, 2 in para X, and 1 in a para VIII.

The author mentions the following etiological factors observed in his own and in other recorded cases:

1. Changes in the vascular system, and the condition of the blood, diseases of the heart, chlorosis, varices, and old thromboses in the lower extremities. 2. Lowering of intra-abdominal pressure after labor. Mechanical causes: pressure of the gravid uterus, firm binders, dorsal position, meteorism. 3. Irregularities of the second and third stages of labor. Retention of part of the placenta or membranes, and all causes of delayed involution. 4. Physical inactivity in the puerperium (possibly also before delivery). 5. Puerperal affections (parametritis, pyemia). 6. Obesity (Gottschalk). 7. Stature (Kraemer, Hiedeman). 8. Endometritis (Gonorrhea). 9. Psychical depression (Sperling). 10. Emotion (v. Winckel). 11. Topographical position of the vessels. (The iliac vein is subjected to pressure by the artery.) Pressure of a loaded sigmoid flexure. 12. Cooling of intestines and vessels during operations; thrombus formation in severed vessels.

Symptomatology. 1. Edema. 2. Definitely palpable, usually sensitive; thickenings in the thrombosed veins. 3. Pain in the inguinal region, especially under Poupart's ligament. Tenderness to pressure over the lower abdomen on the corresponding side. 4. Meteorism, gastric disturbance, anorexia, pressure in the epigastrium, coated

tongue, constipation, thirst. 5. Mahler's sign: ascending pulse — *Treppenpuls*. 6. Usually inconsiderable fluctuations of temperature. 7. Acute pain in the affected veins. 8. Headache. 9. Attacks of cardiac weakness, cyanosis, "air hunger," and "stitch in the side." 10. Striking weakness and giddiness on arising. 11. Delayed involution of the uterus, persistent sanguinolent lochia. 12. Painful defecation, tenesmus. 13. Dysuria, ischuria. 14. Enlargement of the femoral vein on coughing or straining, definite development of a collateral circulation in the subcutaneous veins of the thigh.

The author lays stress on the value of Mahler's sign, which is supposed to be present before other symptoms occur. This sign consists of a gradual step-like increase in the pulse rate, while the temperature remains the same or shows only slight elevations. He explains it by increased demands on heart activity due to the obstruction of a vein by a thrombus.

Mahler's sign was present in two-thirds of Riehländer's; in the remainder it was not present, or was not made out, owing to other febrile complications of the puerperia. The increased pulse rate bears some relation to the resorption of fibrin ferment from the thrombus. In thrombosus of the pelvic veins edema may be wanting.

As important points in the therapy he mentions: 1. Rest, and elevation of the limb. 2. Digitalis for the cardiac weakness and cyanosis. 3. The patient should get up only when the pulse has been normal one to two weeks. Exercise should be cautious and gradual or edema may return after months.—*Ueber Venenthrombosen im Wochenbett. Monatschr. f. Geb. u. Gyn.*, bd. xxiv, p. 2.

W. B. FEHRING.

PLACENTA PRÆVIA. By W. Neitsch. Dissertation (Erlangen, 1905).

After an extensive discussion of the frequency, etiology, symptomatology, diagnosis, and treatment of placenta prævia, the author reports 39 cases of placenta prævia in 5737 labors which came under observation in the clinic at Erlangen from 1880–1905. In these cases the situation of the placenta was lateral in 24, marginal in 8, and central in 7; 6 cases occurred in primiparæ. In 30 cases the vertex presented, in 5 the shoulder, in 3 the breech, and in 1 a foot.

Treatment was employed as follows: Vaginal tamponnade in 4 cases, rupture of the membranes in 9, combined version in 18, intra-uterine colpeurysis in 3. Four cases terminated without interference. The placenta was expelled spontaneously in 16 cases, by the Credi method in 20, and in 3 cases it was removed manually. Of the 36 mothers who survived 20 had afebrile puerperia, 16 had slight elevations of temperature, due to endometritis. Eighteen babies lived, 21 died (53.85 per cent mortality). Two mothers died of hemorrhage; and one, upon whom attempts at delivery had been made before she came to the clinic, died of sepsis. Omitting this one case the natural mortality would be 5.1 per cent. These results for both mother and fetus are favorable, and are below the average. The author considers it desirable that metreurysis, according to the procedure of Dührssen, should have a wider application in the treatment of placenta prævia.—*Ueber Placenta Prævia. W. Nietsch, Erlanger Dissertation* (1905).

W. B. FEHRING.

BOOK REVIEWS

The Practice of Obstetrics

By J. Clifton Edgar

Third Edition. P. Blakeston's Son & Co., 1906.

A careful study of this, the third edition of Edgar's Practice of Obstetrics, shows that the author has a broad and firm grasp on the whole subject of obstetric theory and practice. There is nothing to criticize adversely in the book. One may differ in opinion on the various subjects, but will have to admit that the material is well handled, and represents modern advancement all along the lines of obstetric theory and practice. The stand taken by the author on auto-infection is interesting, showing as it does, the trend of discovery and thought. We are going back to a more active vaginal antisepsis, since it is now proven that active streptococci may inhabit the parturient canal and provoke a fatal infection. While this is true, the writer believes that no amount of chemical disinfection will destroy these germs in their sheltered recesses. Future antisepsis must be in the discovery of a proper antitoxic serum, or means to increase the parturient's immunities.

The chapters on the diagnosis of pregnancy are full, authentic, and satisfying. Perhaps undue prominence is given pelvimetry, but the author gives to both the internal and external methods their proper valuation. Nearly all known methods are described. When all has been done and said, with regard to the measuration of the pelvis and fetus, one must admit that it is the development of the art of obstetric touch that gives the best results in the determination of the mechanical relations of the passenger to the passage. The accoucheur passes his fingers around the pelvis and forms a mental picture of its roominess. He palpates the fetus, especially its head, by conjoined manipulation, determining its size, shape, and hardness; then he fits the head to the pelvis. His art will tell him whether that head will go through that pelvis.

The writer is pleased to note that Edgar practically subscribes to his oft-repeated statement that "pregnancy and labor form *not* a normal function, except in ideally healthy women." On page 185, italicized, one reads, "No one who has had an extensive obstetric experience, can fail to observe that a large number of pregnancies, when carefully studied, are really pathological." "Our present knowledge of the pregnant state demands that women at this time shall be constantly under the care of a competent physician." Normal functions, respiration, digestion, etc., do not require the supervision of a physician, nor do they have an inherent mortality. Pregnancy and labor are complicated so often by disturbances, incidental and accidental, that a really normal case is the greatest rarity.

A chapter is devoted to the toxemia of pregnancy and it glitters with good points. The rôle played by the liver is, perhaps, made more important than our bio-chemical researches would justify. While it is true that the liver shows very marked pathologic changes in fatal cases of toxemia, one must not forget that these may be secondary, as may also be those found in the kidney, to changes in the general metabolism of the body. One again sees how the science of medicine "progresses in spirals." How little does our present notion of toxemia differ from the old notion of "humors in the blood." Then they said "biliousness," now it is called "hepatism." But we are getting nearer the truth. We may soon know what is the chemical nature of these toxins.

Edgar has condensed the causation of eclampsia to its consideration as a violent toxemia. This does not give all the truth. In the treatment of eclampsia the author gives much prominence to drugs which, in the writer's experience, are more harmful than useful. Particularly does the writer fear the effects of chloral and chloroform on the liver. Edgar admits that rapid delivery after the first convulsion is the best treatment for eclampsia, and very properly exhibits the dangers of the usual methods employed, e.g., rapid manual dilation, instrumental dilators, and cervical incisions. Vaginal Cæsarean section is shown scant courtesy, though, in the writer's opinion, it is one of the best methods we have. Unfortunately it is safe only in the hands of the skilled accoucheur, and perhaps this is why Edgar does not recommend its general adoption. He says when the cervix is tight closed, the adoption of a slower method of delivery will give the best results, in the hands of one less skilled in operative delivery, an opinion in which the writer heartily agrees.

The chapters on the mechanism of labor are clear, and well illustrated by diagrams and pictures of new frozen sections.

The chapters on the conduct of labor are practical and the exigencies of private practice fully met. It would reduce the mortality and morbidity of American women enormously, if every practitioner would provide himself, and use properly, the obstetric kit of the author. The division of fatal dystocia is a happy one; errors of attitude, of presentation, of position, and general errors being considered. The prominence given to deflexion of the head, to presentation of the bregma, the so-called "military attitude" of the fetus, is entirely justified. In the writer's experience partial deflexion of the head, so that the large fontanelle is in the axis of the pelvis, is one of the most common forms of dystocia.

The treatment of the puerperium, while not as fully considered as some other subjects, has a satisfying exposition of the essentials of practice. Most of it is nursing detail, and this very properly may be left to the books on obstetric nursing. Edgar keeps his women in bed 2 weeks. "At the beginning of the third week the patient may be lifted into a reclining chair or on a sofa, and may sit up for a short time each day. After the fourth week she may go about the house or drive in the open air, but on no account should she resume her household duties or do any lifting until the period of involution is complete." This is 5 or 6 weeks. For the immense majority of women this advice is absolutely impossible, and it is not yet proven that the long train of evils enumerated by Edgar as resulting from neglect of such precautions, really does occur. Relaxation and laceration of the uterine ligaments, with displacement of the uterus, result more often from bad practices during labor, and subinvolution results oftener from infection than from early rising. A proper conduct of labor will do more to favor an uneventful puerperium than the prolongation of same. Then, too, there are disadvantages of thus invaliding the puerpera.

The classification of puerperal diseases is comprehensive, and shows broad experience. It is gratifying to note that Edgar has arrayed himself on the side of non-active treatment of puerperal sepsis. He justly condemns routine uterine curettage, douching, etc. He leans somewhat to a surgical treatment, and reports no results with anti-streptococcic serum, collargol, etc. While the general arrangement and discussion of this subject are excellent, the writer thinks that the practitioner would absorb more from a simpler exposition of our knowledge, even if it were not so complete.

The pathology of the new-born is given the space so important a subject deserves. Asphyxia neonatorum has eleven pages, and this alone should impress the reader with the necessity for understanding the serious consequences of asphyxia of the new-born. All the known methods of treatment are mentioned. The writer disagrees fundamentally with the author on the use of the tracheal catheter. The author says catheterization of the trachea of the new-born infant is "barbarous." The writer has performed this operation at least 100 times, and never had any bad effects, while many lives have actually been saved by the maneuver. In several cases plugs of mucus and meconium have been aspirated from the *right* and *left bronchi*. As a preventer of atelectasis pulmonum the tracheal catheter is one of the *few* valuable means we possess. The tracheal catheter should be in every obstetric satchel, and the ability to use it should be part of every accoucheur.

The chapters on operative obstetrics are full of good points and teaching illustrations. Gigli's pubiotomy evidently has not yet earned its place in Edgar's book. Lack of space prevents further presentation of this masterly exposition of the obstetric science and art.

J. B. De Lee, M. D.

The Elements of The Science of Nutrition. By Graham Lusk, Ph. D., M. A., F. R. S. (Edin.). W. B. Saunders & Company, Philadelphia.

This book supplies a felt want at this present time of actively-awakened interest in all that pertains to the subject of dietetics and metabolism in general, by affording the student and physician access, in English, to the abundant literature which has accumulated since the days of the chemist Liebig. Prof. Lusk has compressed within the moderate space of this volume, the main facts upon which rests, at the present day, our knowledge of the processes of nutrition. He has arranged the mass of his material in consecutive order of time, so as to show the evolution of his subject. After demonstrating the influence of various food and mechanical factors on nutrition, he proceeds to the consideration of what constitutes a normal diet, and adds brief but succint reviews of the work done toward the solution of the most interesting pathologic variations in metabolism, viz., myxordema, diabetes, gout, etc. The large number of foot-note references comprises an excellent bibliography of the work under consideration. If any criticism is to be made, it is that, in his desire to render full credit to each investigator, rather too sharp a line of division is made in the text between each succeeding reference. This will not render it more lucid to the practitioner, to whom the book is avowedly meant to appeal, and who perhaps may in this case find it difficult to "see the

forest for the trees." To one at least it seems that the author might, without detriment to his subject, have allowed himself a little more latitude in his editorial capacity.

HUMAN ANATOMY. Edited by Henry Morris, M. A., and M. B., London, F. R. C. S., England, and J. Playfair McMurrich, A. M., Ph. D. Fourth edition, revised and enlarged. In five parts. Part I — General Morphogeny; Osteology; Articulation. $1.50. Part II — The Musculature; The Organs of Circulation; The Lymphatics. $2.00. Philadelphia: P. Blakiston's Son & Co.

The very favorable reception accorded the previous editions of this work in America suggested to the editor of this edition, a London surgeon, the desirability of making it international in its character, by placing it largely in the hands of an American editor, and by securing the services of American anatomists in the revision or rewriting of certain of the sections.

The entire work has undergone a complete revision, and some sections, such as those on the Muscles, the Lymphatics, the Central Nervous System, certain of the Sense Organs, the Perineum, and the Skin, have been entirely rewritten and, in several instances, considerably enlarged; the text has been brought thoroughly up to date by the inclusion of the results of recent investigations, and represents, accurately, the present state of anatomy. Many illustrations which appeared in previous editions have been omitted, a large number of new figures have been made from specially prepared drawings, and pictures from other books have been included where they served the desired purpose.

Due credit has been given throughout the book wherever illustrations have been taken or modified, from other works. Special acknowledgment should be made of our indebtedness to Toldt's *Atlas of Anatomy*, Poirier and Charpy, Henle, and Spalteholz.

The same mode of describing illustrations used in previous editions has been carried out as far as practicable. It consists in printing the descriptions in different types at the end of the pointers. Thus, the muscles, fasciæ, and ligaments are in one kind of type; arteries, veins, and lymphatics in another; bones and special organs in a third; nerve structures in a fourth.

Special attention should be directed to the use throughout the volume of the nomenclature adopted by the German Anatomical Society and generally known as the Basle nomenclature, or BNA. In employing this nomenclature the editors have been guided by a desire to assist in the unification of anatomical terminology, seeing in such unification an earnest of the thorough internationalization of the science of anatomy and more rapid progress in its development. The modifications of the accepted English nomenclature necessitated by the adoption of the BNA are comparatively few, and where they are radical, the more familiar terms have been added in parentheses. The slight inconvenience which the present generation may suffer from a partially duplicated nomenclature will, the author argues, be more than compensated for, by the broader outlook gained by future students in having access, through the new terminology, to the best text-books and atlases of foreign lands. Whilst this is the first text-book of anatomy in English to adopt the BNA in its entirety, there are a number of books and papers on Embryology, Histology, and Biology in which it is used; its general adoption in the future, it may be confidently expected, will be assured. In this connection, reference should be made to a new book by Prof. Llewellys F. Barker, of Johns Hopkins University, in which a complete list of the terms used in the BNA is given and in which the object, system, and practicability of the nomenclature is explained.

The editor of the volume distinctly states that each author is alone responsible for the subject-matter of the article following his name. Care has been exercised on the part of the editors, however, to make the whole uniform, complete and systematic.

The following summary of the subjects and authors is appended: Part I — Morphogenesis, Osteology, Articulations, Index. Part II — Muscles; Organs of Circulation, including Lymphatics; Index. Part III — Nervous System, Organs of Special Sense, Index. Part IV — Organs of digestion, of Voice and Respiration; Urinary and Reproductive Organs; Ductless Glands, Skin, and Mammary Glands; Index. Part V — Surgical and Topographical Anatomy, Index.

The following are contributors to the fourth edition: Henry Morris, F. R. C. S., London; R. J. Terry, Washington University, St. Louis; Peter Thompson, King's College, London; Irving Hardesty, University of California; G. Carl Huber, University of Michigan; N. Playfair McMurrich, University of Michigan; Abram T. Kerr, Cornell University; Charles R. Bardeen, University of Wisconsin; Florence R. Sabin, Johns Hopkins University; R. Marcus Gunn, F. R. C. S., London; W. H. A. Jacobson, F. R. C. S., Guy's Hospital, London.

This book is also published in one handsome octavo volume. Cloth, $6.00; sheep or half morocco, $7.00 net.

NIERENCHIRURGIE: EIN HANDBUCH FÜR PRAKTIKER. By Prof. Dr. C. Garrè, Geh. Med.-Rat, Direktor der chirurgischen Klinik der Universität Breslau, and Dr. O. Ehrhardt, Privatdozenten für Chirurgie an der Universität Königsberg i. Pr. With 90 illustrations. Published by S. Karger, Berlin, 1907.

While the authors disclaim any attempt to make the volume a complete compendium of the literature of renal surgery, the 350 pages, well written and freely illustrated leave little to be desired as regards completeness in description.

The subject is presented in nineteen chapters. The first chapter of ten pages, on anatomy and physiology, is devoted mainly to a very short outline of the anatomy, which includes a description of Gerota's renal fascia, and Hyrtl's distribution of the renal arteries. The examination of urine is dispensed with, as uncalled for in a work of this scope.

The second chapter, is devoted to methods of examination. The methods of physical diagnosis in general use are first described. It is interesting to note that in line with most men who have had extensive experience with the X-rays as a diagnostic measure in nephrolithiasis, the authors regard the method as one of almost absolute accuracy. Cystoscopy, ureteral catheterization, and segregation, more particularly by means of Luy's segregator, are all described in some detail, as are also the various means of studying renal functional activity.

The chapter on general surgical technique is eminently satisfactory. Lumbar and transperitoneal methods are described, with their indications. Landmarks are sufficiently described and the various incisions are illustrated: of these Simons and von Bergmann's are preferred for the lumbar route. The immediate and remote sequelæ of nephrectomy are detailed. The indications for resection, nephrotomy and nephrostomy and the technique of operation are taken up in this same chapter. A short chapter is devoted to the congenital anomalies of the kidneys and ureters.

The subject of movable kidney is given in a full chapter. The anatomy is fully dealt with, the various theories as to etiology are fully gone into. Symptoms, diagnosis and finally treatment, general and surgical, are freely considered. Surgical interference in nephritis is taken up in the form of an analysis of the work done, and a distinctly unfavorable conclusion is drawn.

An exhaustive chapter is devoted to the injuries to the kidneys. These are divided into three types; subcutaneous, open, and, as a separate and distinct group, gun-shot wounds. The etiology and nature of accompanying injuries, the diagnostic methods, the indications for interference and the technique employed, are all fully considered.

Renal tuberculosis is discussed at considerable length. The infection is looked upon as hematogenous in the great majority of cases. The same full consideration is given acute infection of the kidney, hydronephrosis, nephrolithiasis, tumors and cysts.

Throughout the text references are given to the literature of the subjects, each chapter ending with a list of the works referred to. The various chapters are fully illustrated.

H. M. RICHTER, M. D.

ANESTHETICS: THEIR USES AND ADMINISTRATION. By Dudley Wilmot Buxton, M. D., B. S. Fourth edition. Philadelephia: P. Blakiston's Son & Co., 1907.

The present edition, the fourth, includes fresh articles dealing with dosimetry in chloroform, the use of ethyl chloride as a general anesthetic, and the production of anesthesia by spinal injection. To make room for these it has been necessary to omit some paragraphs and descriptions. The writer has attempted to place before his readers such facts and theories concerning anesthetics as he deemed to be essential; he makes no claim to have included either the views of all competent authorities, or any account of the apparatus which, in his judgment, are not necessary for the beginner. The manual is intended as a handbook for students and practitioners, and as such contains only what the writer has personally tested, and upon which he has been enabled to form an opinion. The chief additions are the introduction of a full description of Mr. Vernon Harcourt's chloroform regulator; some mention of Dr. Dubois' and Dr. Levy's dosimetric chloroform apparatus; an account of ethyl chloride and its mixtures; and a *résumé* of recent work dealing with the local analgesia and spinal anesthesia. The whole of the book has been revised and largely rewritten, so as to include some account of recent scientific research upon anesthetics.

PROGRESSIVE MEDICINE. Vol. 1. A quarterly digest of advances, discoveries, and improvements in the medical and surgical sciences. Edited by Hobart Amory Hare, M. D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia. Assisted by H. R. M. Landis, M. D., Demonstrator of Clinical Medicine in the Jefferson Medical College. Philadelphia and New York: Lea Brothers & Co., March 1, 1907. $6.00 per annum.

The first number of volume nine, issued March first, is prepared by the following contributors: Floyd M. Crandall, M. D., Charles H. Frazier, M. D., D. Braden Kyle, M. D., Robert B. Preble, M. D., Alexander B. Randall, M. D.

The surgical portion by Dr. Frazier includes surgery of the head, neck, and thorax, and the name of the author is sufficient guarantee as to the scientific standing and excellence of the contributions. It covers 121 pages and is particularly valuable in its discussion on surgery of the head, which is reviewed in a masterly manner. Contributions to surgery of the thyroid gland during the past year have warranted the author in an extensive discussion of that subject, particularly from its surgical standpoint.

The section upon infectious diseases by Robert B. Preble is a valuable review of this subject. He has discussed the subject of treatment fully, which adds to the value of the volume.

Other contributions upon Diseases of Children, Rhinology and Otology, are edited in a satisfactory manner.

BOOKS RECEIVED

A TEXTBOOK OF PATHOLOGY. New (fifth) edition, thoroughly revised. By Alfred Stengel, M.D., Professor of Clinical Medicine in the University of Pennsylvania. Octavo of 977 pages, with 399 text illustrations, many in colors, and 7 full-page colored plates. Philadelphia and London: W. B. Saunders Company, 1906. Cloth, $5.00 net; half morocco, $6.00 net.

PRACTICAL GYNECOLOGY. A COMPREHENSIVE TEXTBOOK FOR STUDENTS AND PHYSICIANS. By E. E. Montogmery, M.D., LL.D., Professor of Gynecology, Jefferson Medical College; Gynecologist to the Jefferson Medical College and St. Joseph's Hospitals; Consulting Gynecologist to the Philadelphia Lying-in Charity and the Kensington Hospital for Women. Third revised edition. With 574 illustrations, the greater number of which have been drawn and engraved especially for this work, for the most part from original sources. Philadelphia: P. Blakiston's Son & Co., 1907. $5.00 net.

NIERENCHIRURGIE. Ein Handbuch für Praktiker. Von Prof. Dr. Carl Garrè, Geh. Med.-Rat, Direktor der chirugischen Klinik der Universität Breslau, und Dr. O. Ehrhardt, Privatdozenten für Chirurgie an der Universität Königsberg i. Pr. Mit 90 Abbildungen. Berlin, 1907. Verlag Von S. Karger.

JOHNS HOPKINS HOSPITAL REPORTS. Vol. xiii — Studies in Urological Surgery. By Hugh H. Young, M.D. Vol. xiv — Studies in Hypertrophy and Cancer of the Prostate. By Hugh H. Young, M.D. Baltimore: The Johns Hopkins Press. 1906.

DISEASES OF CHILDREN. A manual for students and practitioners. By George M. Tuttle, M. D.; Attending Physician to St. Luke's Hospital; Martha Parsons Hospital for Children; Bethesda Foundling Asylum; Professor of Therapeutics, Medical Department of Washington University, St. Louis. Series edited by Bern B. Gallaudet, M. D., Demonstrator of Anatomy and Instructor in Surgery, College of Physicians and Surgeons, Columbia University, New York; Visiting Surgeon, Bellevue Hospital, New York. Second edition, revised and enlarged. Illustrated with five plates in colors and monochrome. Philadelphia and New York: Lea Brothers & Co. 1906.

ON DISEASES OF THE RECTUM AND ANUS, INCLUDING THE FIFTH EDITION OF THE JACKSONIAN PRIZE ESSAY ON CANCER. By Harrison Cripps, F. R. C. S. Senior Surgeon, St. Bartholomew's Hospital; Member of the Council, Royal College of Surgeons; Vice-president of the Royal Medical and Chirurgical Society. Third edition. London: J. & A. Churchill, Philadelphia, P. Blakiston's Son & Co. 1907. $4.20 net.

MODERN SURGERY: GENERAL AND OPERATIVE. By John Chalmers Da Costa, M. D., Professor of the Principles of Surgery and of Clinical Surgery, Jefferson Medical College, Philadelphia; Surgeon to the Philadelphia Hospital and Consulting Surgeon to St. Joseph's Hospital, Philadelphia. Fifth edition, thoroughly revised and enlarged, with 872 illustrations, some of them in colors. Philadelphia and London: W. B. Saunders Company. 1907. Cloth, $5.50 net; half morocco, $7.00 net.

THE PRINCIPLES AND PRACTICE OF DERMATOLOGY; DESIGNED FOR STUDENTS AND PRACTITIONERS. By William Allen Pusey, A. M., M. D., Professor of Dermatology in the University of Illinois; Dermatologist to St. Luke's and Cook County Hospitals, Chicago; Member of the American Dermatological Association. With one colored plate and 367 text illustrations. New York and London; D. Appleton & Company, 1907.

ATLAS AND EPITOME OF DISEASE OF CHILDREN. By Dr. R. Hecker and Dr. J. Trumpp, of Munich. Edited with additions, by Isaac A. Abt, M. D., Assistant Professor of the Diseases of Children in Rush Medical College in affiliation with the University of Chicago. With 48 colored plates, 147 black and white illustrations, and 453 pages of text. Philadelphia and London: W. B. Saunders Company, 1907. Cloth, $5.00 net.

DIAGNOSTICS OF THE DISEASES OF CHILDREN. By Le Grand Kerr, M.D., Professor of Diseases of children at the Brooklyn Post-graduate Medical School. Octavo of 542 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1907. Cloth, $5.00 net; half morocco, $6.50 net.

SURGICAL DIAGNOSIS. By Daniel N. Eisendrath, M. D., Adjunct Professor of Surgery in the Medical Department of the University of Illinois (College of Physicians and Surgeons). Octavo of 775 pages, with 482 original illustrations, 15 in colors, Philadelphia and London: W. B. Saunders Company, 1907. Cloth, $6.50 net; half Morocco, $8.00 net.

THE PRACTICAL MEDICINE SERIES. Comprising ten volumes on the year's progress in medicine and surgery. Under the general editorial charge of Gustavus P. Head, M. D., Professor of Laryngology and Rhinology, Chicago Post-graduate Medical School. Volume II — General Surgery. Edited by John B. Murphy, A. M., M. D., LL. D., Professor of Surgery in Rush Medical College, in affiliation with the University of Chicago. Chicago: Year Book Publishers. 1907. $2.00.

ÉLÉMENTS D'OBSTETRIQUE. Par le Dr. V. Wallich, Professeur Agrégé a la Faculté de Médecine de Paris. Paris: G. Steinheil, 1907.

SURGICAL DISEASES OF THE CHEST. By Carl Beck, M. D., Professor of Surgery in the New York Post-Graduate Medical School and Hospital; Visiting Surgeon to the St. Mark's Hospital and the German Poliklinik; Consulting Surgeon to the Philanthropic Hospital; President of the American Therapeutic Society; President of the New York Society of Medical Jurisprudence; Formerly Chairman of the Surgical Section, International Congress of Art and Science, St. Louis, September, 1904, etc. Philadelphia: P. Blakiston's Son & Co., 1907. $5.00.

A MANUAL OF OBSTETRICS. By A. F. A. King, A. M., M. D., L.L. D., Professor of Obstetrics in the Medical Department of the George Washington University, Washington, D. C., and in the University of Vermont; President (1885–86–87) of the Washington Obstetrical and Gynecological Society; President (1883) of the Medical Society of D. C., and of the Medical Association of D. C. (1903); Fellow of the British Gynecological and the American Gynecological Societies; Consulting Physician to the Children's Hospital, Washington, D. C.; Obstetrician to the George Washington University Hospital; Member of the Washington Academy of Sciences; Fellow of the American Association for the Advancement of Science; Associate Member of the Philosophical Society of Great Britain; and member of the Medical, Philosophical, Anthropological, and Biological Societies of Washington, D. C., etc. Tenth edition, revised and enlarged. With 301 illustrations in text and 3 plates. Philadelphia and New York: Lea Brothers & Co., 1907.